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# THE FOUNDRY

## A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

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APRIL 10, 1893.

Vol. II. No. 8.

Published Monthly by THE FOUNDRY PUBLISHING CO.

DETROIT, MICH.

# TALC.

We are pleased to inform the Foundry trade that from now on we will be able to fill

... ALL ORDERS ...

Promptly for our famous : : : : : : : : :

## NORTH CAROLINA TALC.

Owing to the extraordinary demand we hove had for it and our limited capacity at the mines, we were compelled to send generally one-half of the order received from customers. We can now **FURNISH IMMEDIATELY** either White or Blue, packed in sacks or barrels, by the sack, barrel or carload, from Cincinnati or the mines. To those who have never used our TALC, we invite a trial, Samples sent free. Common Soapstone Facing is "not in it" with this material. Address communications to

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CINCINNATI, OHIO, U. S. A.

## 10,000,000 BARRELS(?) SOLD IN 1892

# "Peerless"

In all that its name implies. To obtain all kinds of handsome if not perfect castings at a merely nominal cost of labor and at minimum expense for the material, use appropriately

## Peerless Pure Plumbago

## or Peerless Wash

for all kinds of castings; these materials may be brushed, dusted or rubbed on and into the moulds with the hands. Are the essential material required for Dry Sand, Core and Loam Work and Large Bells.

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For fine Bronze, Brass, Chandelier and other amalgamated metal castings. The

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Both light and heavy. Also for Piano Plate.

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For general use is "last though not least." No "sticking, no washing," no "running," easily "slicked," easily "peeled."

For Machinery of all kinds we manufacture

**Peerless Lubricating Plumbago**
The best dry lubricant extant.

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SENT FREE OF CHARGE on application. State what kind of castings you want the material for, when ordering.

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MANUFACTURERS OF
Foundry Facings and Blackings.

IMPORTERS AND REFINERS OF
Graphite, Black Lead, Silver Lead or Plumbago.

AND DEALERS IN
All Kinds of Foundry Supplies, Moulders Tools, Sand, Brick and Iron, Brass and Steel Foundry Equipments.

We also manufacture the celebrated BRILLIANT Facings and Blackings which bear a meritoriously world-wide reputation. We invented these and gave them their trade name in the spring of 1884, as the records in Washington will verify. "All names similar in sound or meaning to the word" BRILLIANT as applied to Foundry facings or blackings WERE ADOPTED SINCE JULY 26, 1884. This we are amply prepared to prove. "Imitation is its best recommendation."

## THIS IS NOT A CATCH-PENNY OR PATENT MEDICINE ADVERTISEMENT

Claiming to cure all the ills the iron craft is heir to with a uniform remedy. To obtain perfect castings or the best desired results five conditions are indispensable; these qualifications are the metal, fuel, moulding sand, good molders and facings or blackings. The latter alone are neither responsible for good nor are they to be blamed for evil results; their attributes even if they perform their functions to perfection do but *assist* the other factors herein mentioned. They may work perfectly in one kind of sand or under certain grades or mixtures of iron and yet often act adversely when used on another sand or under other metals that have no affinity for them. The Facings or Blackings are but one of the factors upon which are dependent satisfactory, economical or artistic castings. All these conditions being present at the same time constitute the combination known in mythology, tradition and history as "The Philosopher's Stone," a transparent and glaring RADIANT humbug.

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THERE IS ONLY ONE WAY TO DO IT,

Turn out Nice, Bright, Smooth Castings from the Molds and Save Expense of Dressing, Cleaning and Scraping same Afterwards.

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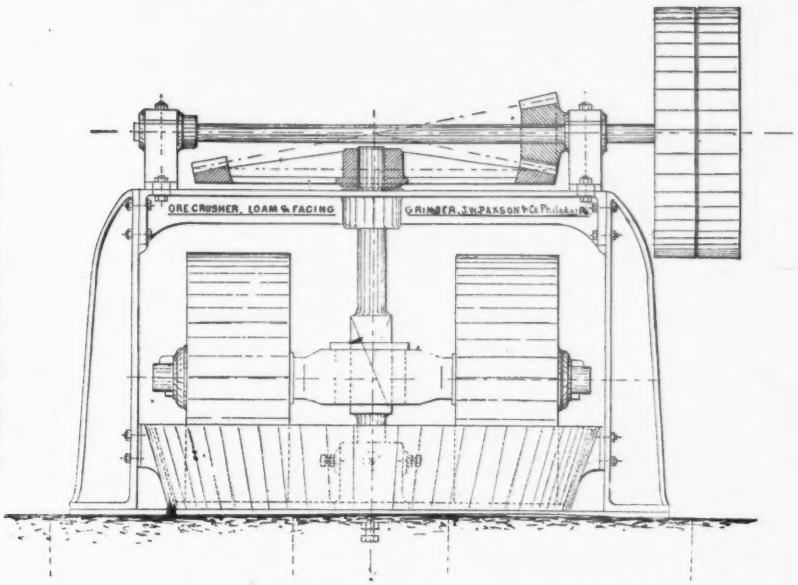


Height Rollers, 36 inches; Face of Rollers, 15 inches; Floor Space, 8 x 6 feet; Weight, about 10,000 lbs. Made in three sizes, Steel Rollers and Ball Bearings.

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MENTION THE FOUNDRY.

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—DEALERS IN—

Moulding Sand, Fire Sand,
Philadelphia Sand, French Sand,
Fire Clay, Kaolin, and Foundry
Facings and Supplies of all Kinds,
Lead Facings a Specialty.

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DESIGNERS AND BUILDERS IN

IRON AND STEEL

## Fire Proof Buildings

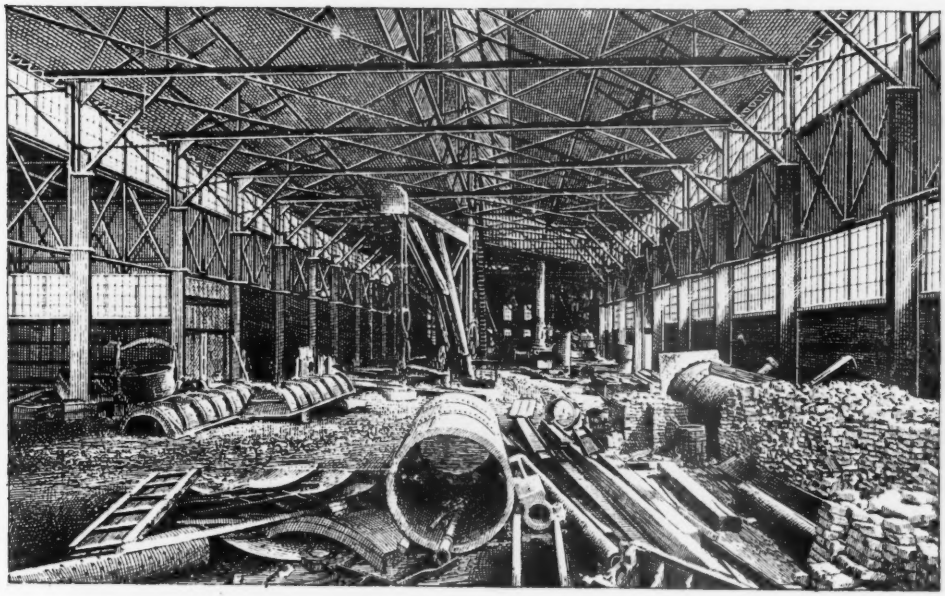
—FOR—

Foundries, Machine Shops,

ETC., ETC.

BUILDINGS DESIGNED FOR SPECIAL REQUIREMENTS.

Traveling and Jib Cranes for handling Heavy Castings and Machinery.



The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

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# Founders' Perfect Wash

LEADS THE WORLD WHEN USED ON

## Loam, Dry Sand and Skin Dried Castings.

NO CASTINGS TOO LARGE.

## Our Claims are Substantial.

ROBERT SMACK & CO.,
IRON FOUNDERS.

New York City, Feb. 11th, 1893.

Cleveland Facing Mills,

Gentlemen:

Please ship us on as soon as possible, 1000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We find it works better than anything we have ever used.

Yours truly,
Robert Smack & Co.

FRASER & CHALMERS,
FULTON AND UNION STREETS.

Chicago, Nov. 28, 1892.

Messrs. Cleveland Facing Mills, Cleveland, O.

Gentlemen;—Replying to your favor of the 18th, concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he has ever used.

Yours truly,
H. P. Young, Purchasing Agent.

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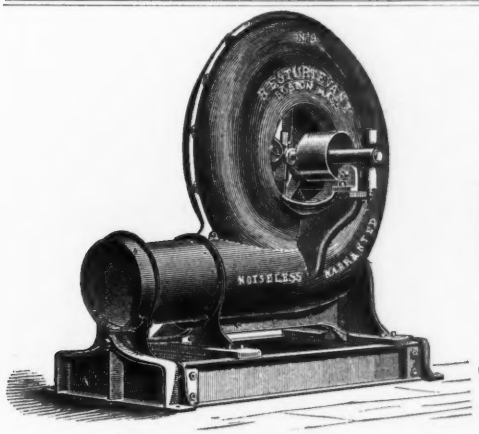
Foundry Facings, Blackings and Foundry Supplies.

WE SHALL BE PLEASED TO QUOTE YOU.

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## Cupola Furnaces and Forge Fires.

## BLOWERS

Furnished without Bed with Separate Countershaft

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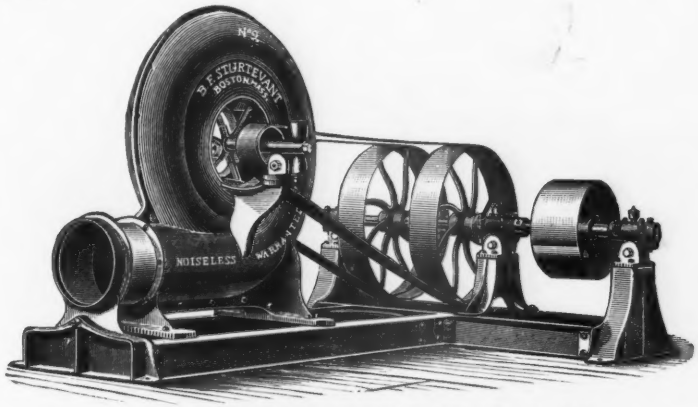
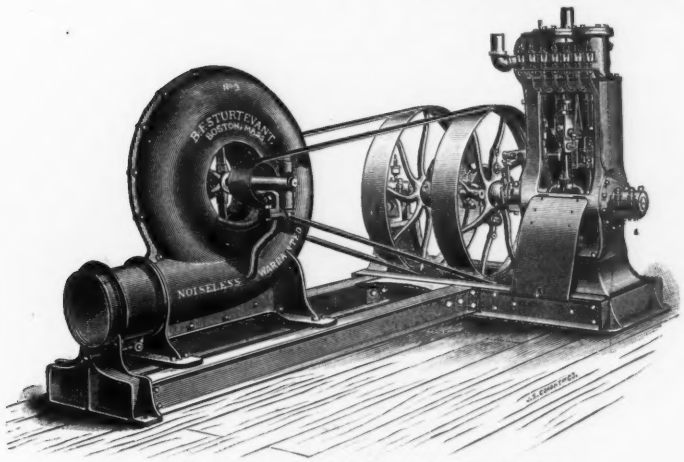



Blower on Adjustable Bed with Combined Countershaft.




Blower on Adjustable Bed with Double Enclosed Engine.

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WITH

## THE STURTEVANT

Direct Connected

## Electric Motors.

Send for Catalogue.


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**American Foundry Practice,** treating of Loam, Dry Sand, and Green Sand Molding, and containing a Practical Treatise upon the management of cupolas and the melting of iron, by Thomas D. West, a practical iron molder and foundry foreman. Contains 391 pages fully illustrated. Price, $2.50 postpaid, with "THE FOUNDRY" one year, $3.50.

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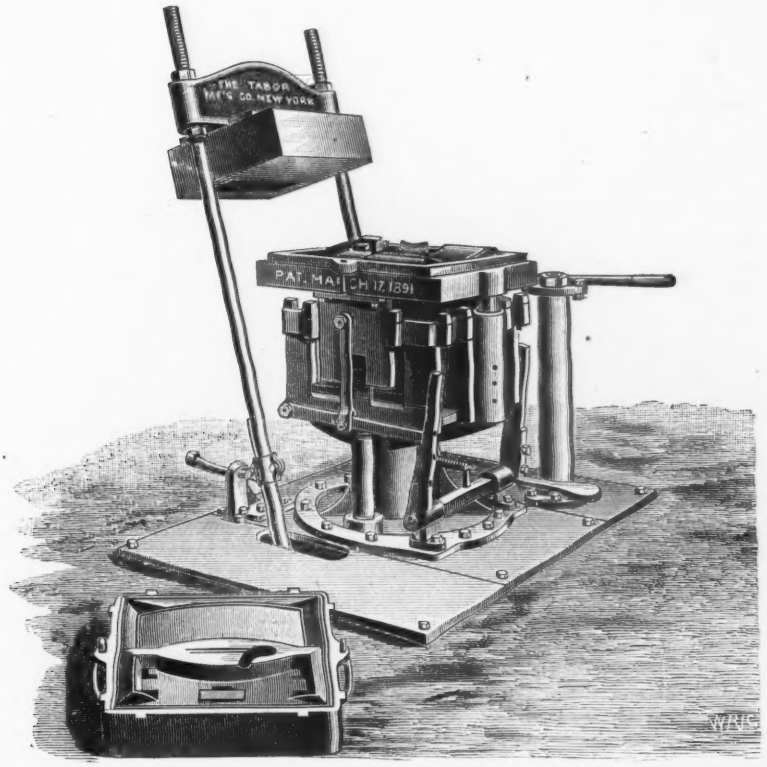
## AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.




These machines are adapted to general castings when made in reasonable quantities.

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Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

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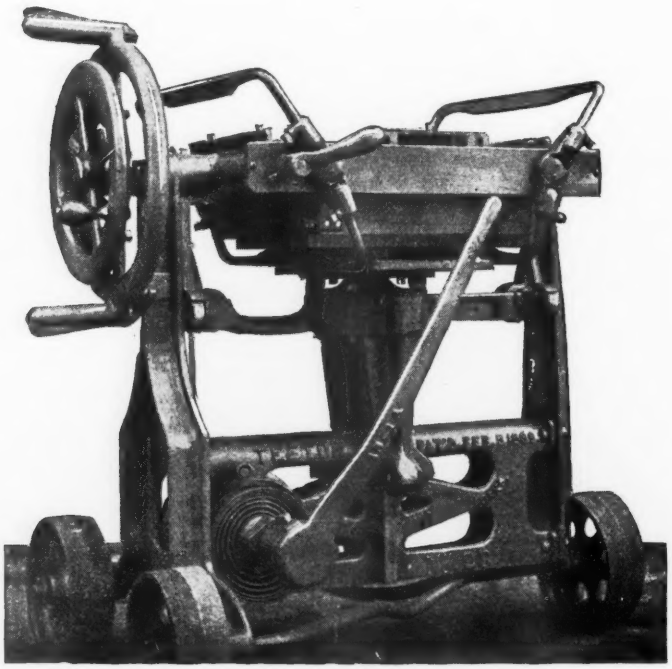
Large numbers are in use in some of the principal Foundries in the Country.



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Carload Lots delivered to any part of the U. S. Ask for quotations.

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## FOR CUPOLA FURNACES, FORGE FIRES, ETC., ETC.

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## Adjustable Bed Combined with Countershaft,

—ALSO WITH—

## DOUBLE UPRIGHT ENCLOSED ENGINE.

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Made for use in any position, and will produce any desired pressure.

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**All Sizes Kept in Stock.**

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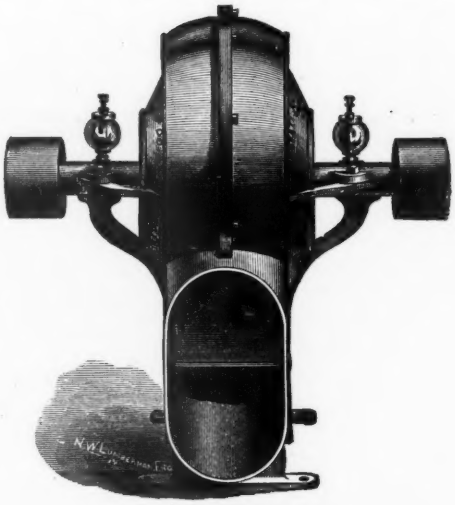

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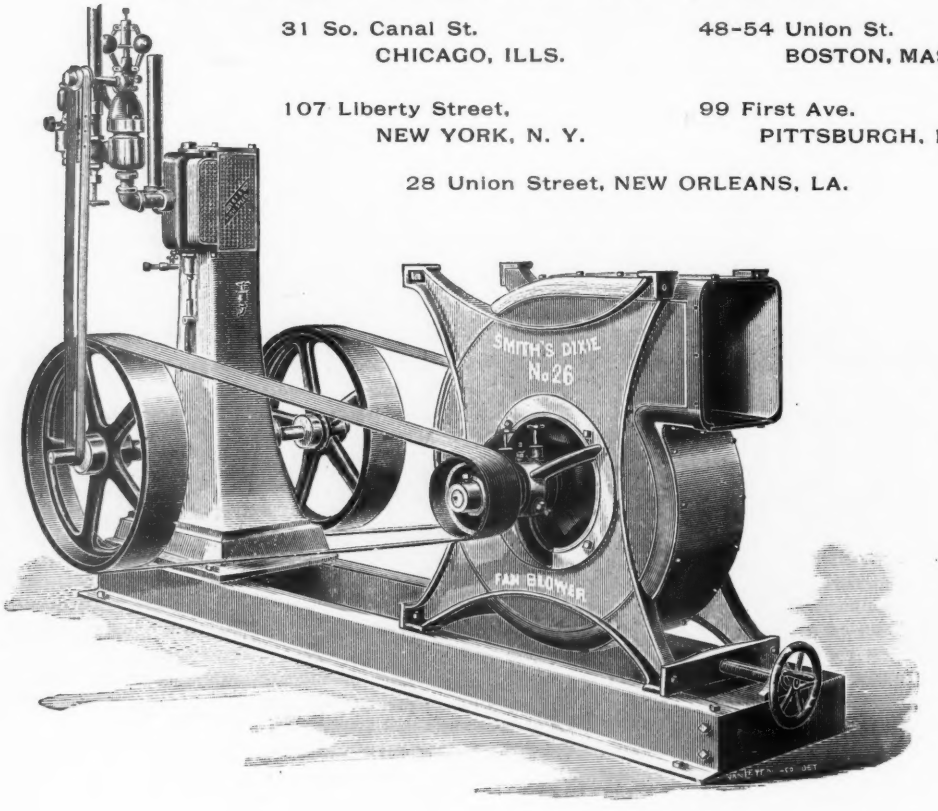

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MANUFACTURERS OF
**Hand, Steam, Hydraulic and Electric Cranes,**
FOR ALL PURPOSES.
**FOUNDRY LADLES, CHAINS & GENERAL MACHINERY.**
Correspondence Solicited. Write for Catalogue.

ESTABLISHED 1873.

# THISTLE BRAND
# Anti-Friction Metal.

**In Use Everywhere and endorsed as being Unexcelled.**

Read what W. & A. Fletcher Company, the leading Marine Engine Builders of New York say:

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NORTH RIVER IRON WORKS
Mudson St., 12th to 14th Sts.

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Mr David Wilson
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to your enquiry for our opinion of your
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of cases for the past two years and always
with entire Satisfaction — We consider
it excellent in quality and have no
hesitation in recommending its use
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Yours Respectfully
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A. F. Fletcher Gen.

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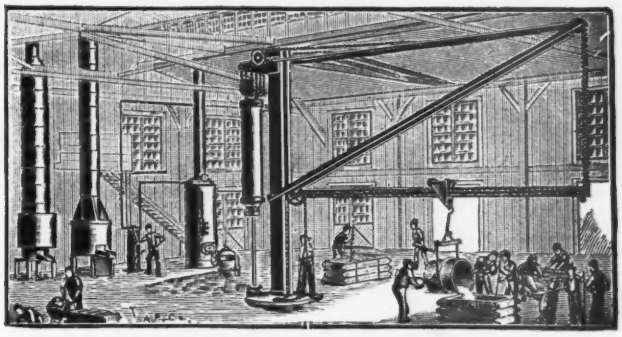

Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

## THE GREATEST FOUNDRY CRANE KNOWN.

**The Latest New Foundry to Adopt this Crane is that of**

## GAAR, SCOTT & Co.,

**RICHMOND, IND.**

Who will use **FIVE** of Them.

## WHY DID THEY SELECT THIS CRANE?

They went up to **FRASER & CHALMERS, CHICAGO,** and saw the Crane at work in the foundry there and that settled it.

**Everybody who sees this Crane at work, falls in love with it.**

## WHY?

Because it does the work quick. Lifts a load while other cranes are getting ready to do it. Lifts 10 tons as quickly as 10 pounds. Never gets out of order. No shocks. No jars. Requires no special operator. Every man in foundry works it. No matter how dumb or careless, can't hurt himself, work, or machine. All molders like it. Has a perfect motion. Foundries using it say it saves its cost in a year in good draws. Swings very easy. A 5-ton crane with a 3-ton load on it is in about the same condition as other cranes with out any load on them. Crane is attached to ordinary steam supply at the trifling cost of a little pipe. Uses so little steam it is never missed. In fact, in a small card we can't give one-half of its excellencies. You must write us.

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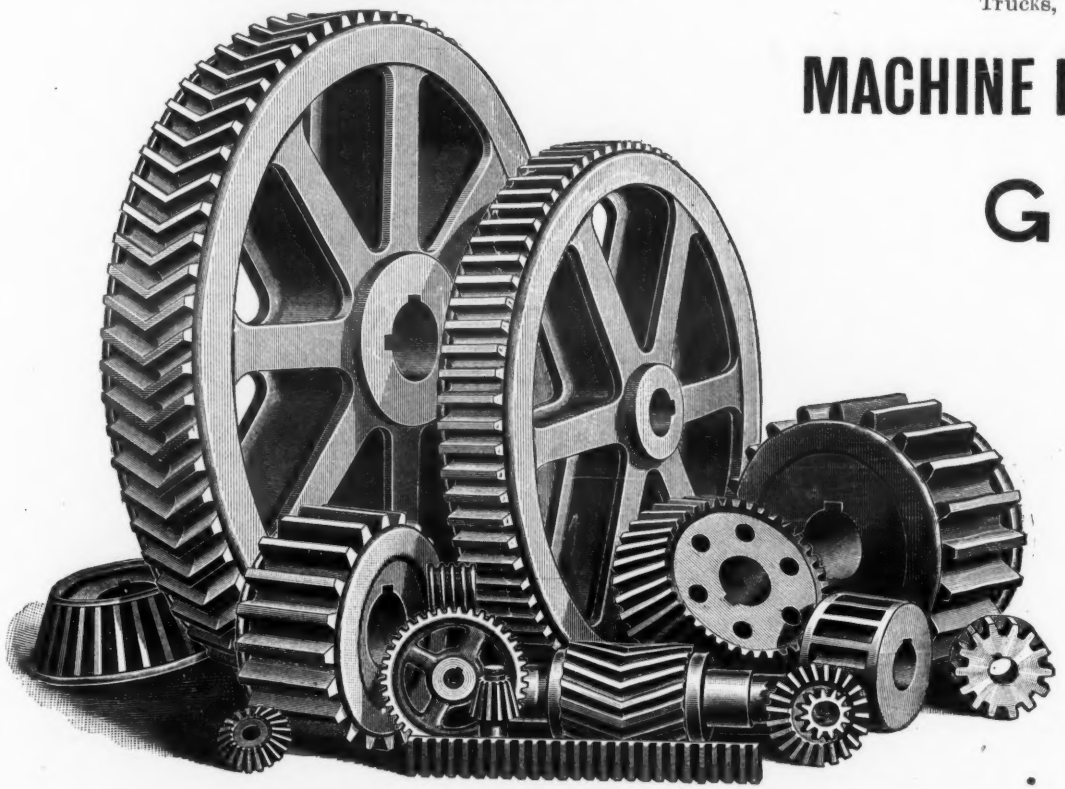

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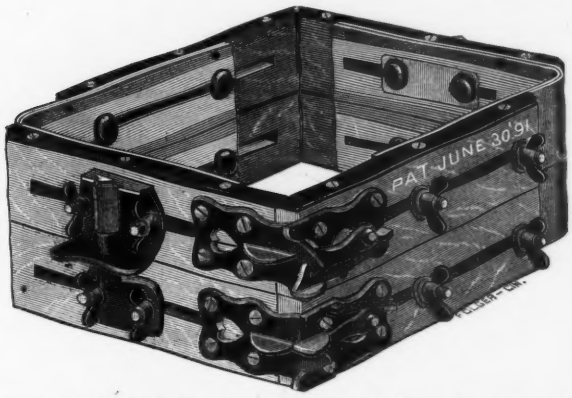
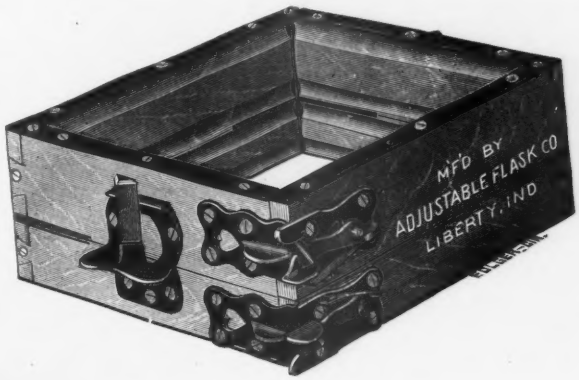
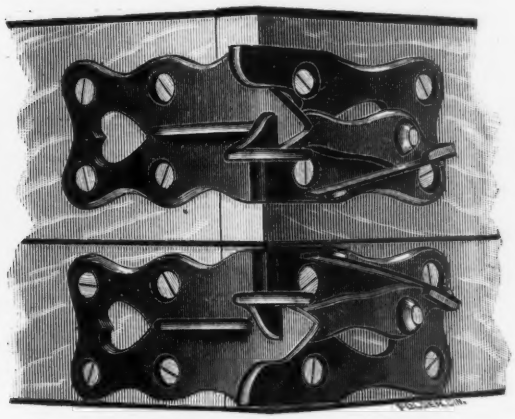



We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

### TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.



### AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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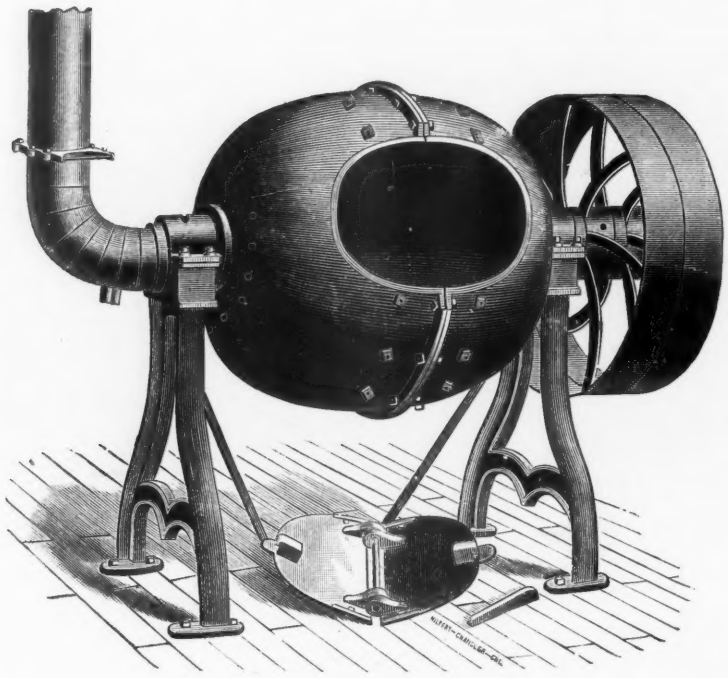

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of Barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

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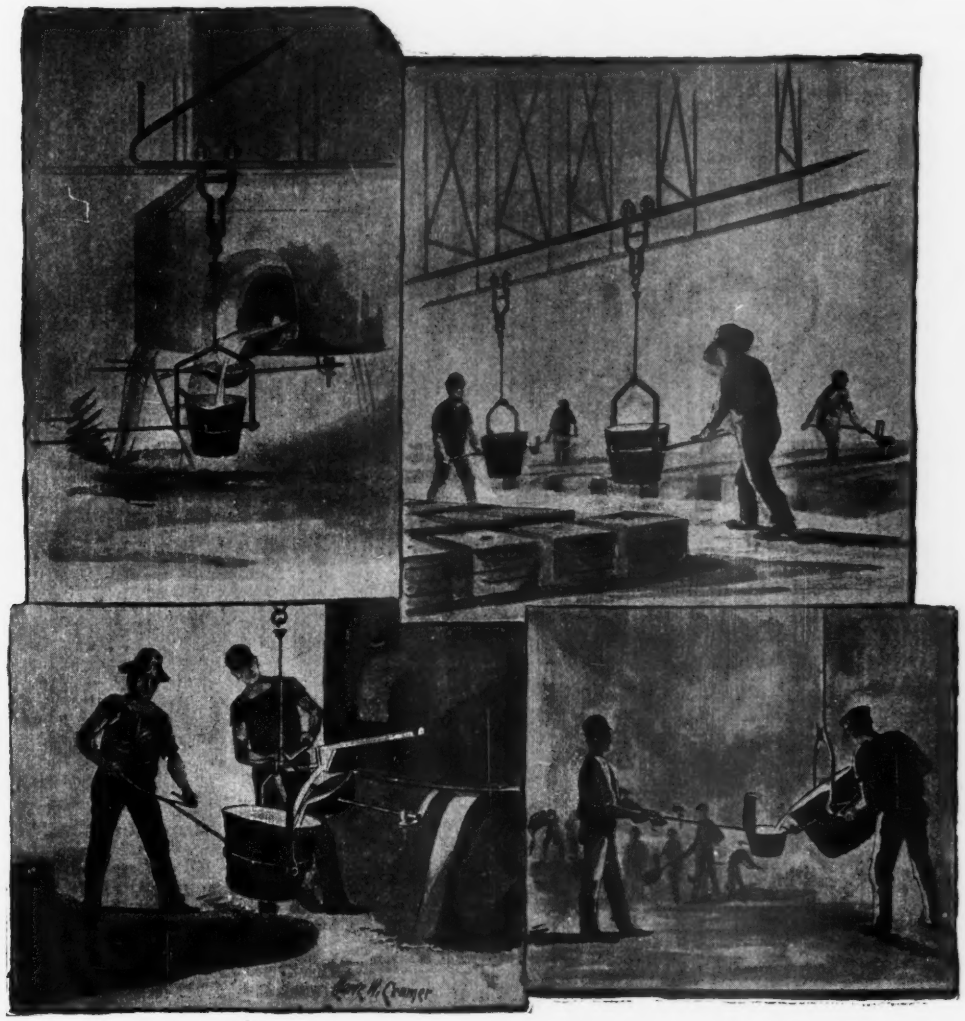

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Just the thing for Stove, Architectural, Car and in fact all kinds of foundries where it is necessary to have "rapid transit" of iron from cupola to mold. Will save its cost in six months in labor to say nothing of better castings, convenience and economy in material. For full information, cost, etc. Address,

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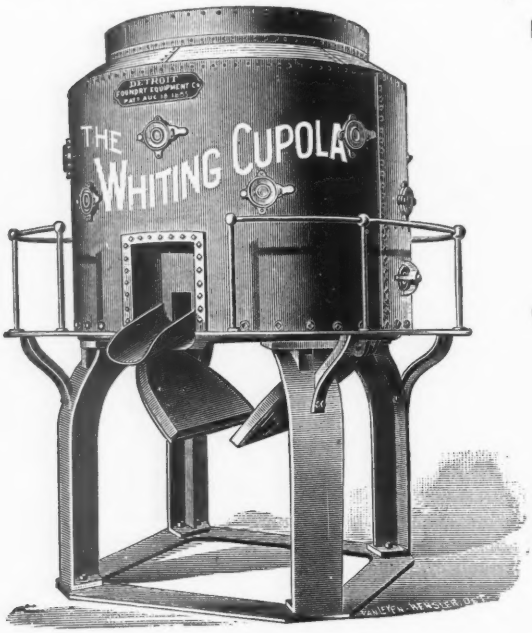


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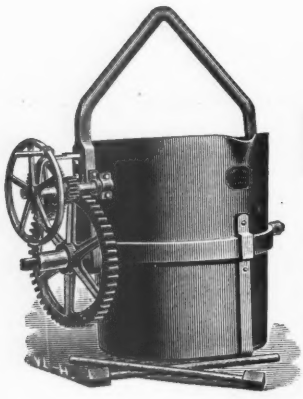

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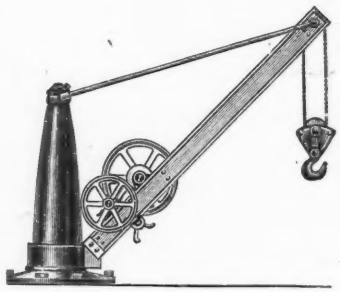

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# THE FOUNDRY

VOL. 2. DETROIT, MICH., APRIL, 1893. No. 8.

## FOUNDRY PRACTICE WITH KEEP'S TEST.

BY W. J. KEEP, DETROIT, MICH.

IF it were possible by chemical analysis to determine what change should be made in a mixture of iron to produce a desired result, such a course is expensive and slow. Cheap irons cannot be purchased on guaranteed analysis, for a furnace will not run regularly, and even the two ends of the same pig will not give the same analysis. In ordinary marketable pig-iron, phosporus and manganese will not run over one per cent., and sulphur will run only a few hundredths. As the first two exert very little influence on foundry iron, and do not increase chill or make iron white, we may ignore their presence. It is well to purchase irons that have a good reputation. The most common element found in pig-iron and the most important is silicon. Its presenc up to about three per cent. makes iron soft and gray and reduces shrinkage.

It does this by changing carbon into dark and bulky graphite, which colors the iron and makes the casting larger. Silicon is an antidote for any thing that produces an opposite effect. All we have to do, therefore, in everyday practice is to is that silicon is present to the extent that is required.

Owing to circumstances, the founder must purchase the iron that is cheapest in the market, and from it make the best castings. Iron that is low in silicon is cheap, and vice versa. We should, therefore, get as much silicon as possible in cheap irons. Often close-grained, light-colored No. 2 or 3 pig is higher in silicon than a more open and darker iron. For large castings silicon must be low, and for thin castings it must be high.

If chilled castings are to be made, irons must be selected that have a natural tendency to chill. Such tendency is not due to ascertained chemical composition. If a founder applies "Keep's Test" to a casting which is acceptable, its shrinkage, chill and strength is a standard by which to judge future work. Within certain limits, by keeping the shrinkage uniform, the castings will be uniform. As a practical application we will first present the record of tests of four brands of pig-iron, and then present the results of four mixtures of these four irons.

The grain of a center fracture of a test bar is shown by the square drawing, while the rectangular drawings represent the end of a bar with the side broken off, showing the depth of chill and the grain.

The chemical analysis of test bars of the pig-iron is given in table I.

TABLE I.

| No. Test. | | T C | Si. | P. | Mn. | S. | G C | C C |
|---|---|---|---|---|---|---|---|---|
| 376 | White Pig Iron.... | 3.13 | 0 25 | 0.26 | 0.09 | 0.03 | 1.62 | 1.51 |
| 441 | Gray Pig Iron..... | 3.55 | 1.20 | 0.84 | 0.18 | 0 04 | 3.22 | 0.33 |
| 397 | Gray Silicon Pig... | ... | 4.36 | .... | .... | .... | .... | ... |
| 401 | Flaky Silicon Pig.. | 1.99 | 10.34 | 0.45 | 0.52 | w | 1.92 | 0.07 |

The figures on the ends of the test bars indicate the actual chemical analysis of those bars. It was intended to have them as nearly as possible 1.50, 2.00, 2.50 and 3.00.

The original pig-iron from which 376 was made contained T. C. 2.98, of which only 0.95 was G. C. 397 is supposed to be of nearly the same composition as 401 except as to silicon.

Fig. 33—(Table II) shows the four original irons.

The following records show the results

of adding to one of the two pig-irons, enough of one of the silicon irons to make test bars with 1½, 2, 2½ and 3 per cent. of silicon (actual analysis is marked

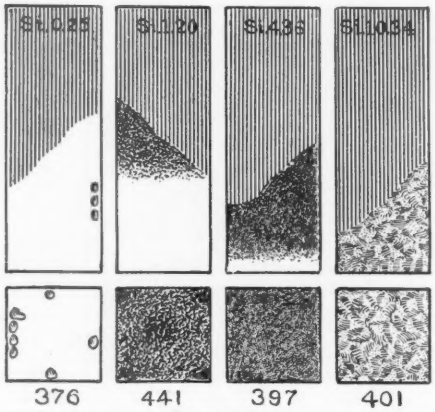


FIG. 33

on the bars). They show that the pecularities of a pig-iron remain in the mixture, and will not be wholly eliminated by a change of chemical composition.

The introduction of silicon has formed graphite artificially, making a very fine mottled grain and a very solid casting.

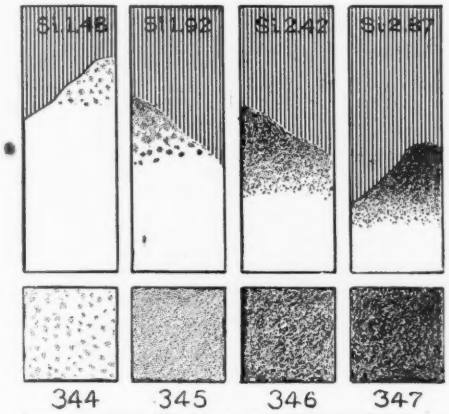


FIG 34

Fig. 35—(Table IV) is a mixture of the same white pig-iron (376) with gray silvery iron (397), which latter is made from a mixture of the same ores as 401, together with ores that alone would have made a high chilling iron. 397 would, therefore, carry a large percentage of silicon and still make a very close black iron much like the mixture in Fig. 34 if the silicon had been carried to 4½ per ct.

By using a low silicon softener we were obliged to use more of it, and have

TABLE II.—(Fig. 33)

| No. Test. | Iron. | Dead Load. | | Impact. | | Shrinkage. | | Hardness. | Chill. | D. L. Strongest Single Test Bar. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength. | Def. | Strength. | Def. | Sq. Bar. | Thin Bar. | | | |
| 376 | White.... | 379 | .14 | 237 | .16 | .248 | .246 | 100 | All. | 384 |
| 441 | Gray..... | 362 | .27 | 339 | .29 | .168 | .186 | 74 | .40 | 379 |
| 397 | Silvery... | 478 | .25 | 425 | .27 | .139 | .146 | 64 | .10 | 514 |
| 401 | Flaky .... | 231 | .12 | 125 | .11 | .199 | .201 | 132 | .0 | 245 |

Fig. 34—(Table III) is a mixture of white pig iron (376) and a portion of flaky silvery iron (401.)

The carbon in the white pig-iron being nearly all in the combined state, so little of 401 was used that it introduced but little of its peculiar characteristics.

TABLE III—(Fig. 34)

| No. Test. | Percentage. Silicon. | Dead Load. | | Impact. | | Shrinkage. | | Hardness. | Chill. | D. L. Strongest Single Test Bar. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength. | Def. | Strength. | Def. | Sq. Bar. | Thin Bar. | | | |
| 344 | 1½ per cent. silicon. | 466 | .14 | 299 | .15 | .227 | .243 | 84 | All. | 495 |
| 345 | 2 per cent. silicon. | 486 | .21 | 356 | .21 | 1.169 | .339 | 60 | 1.25 | 508 |
| 346 | 2½ per cent. silicon | 416 | .19 | 362 | .21 | .163 | .220 | 57 | .60 | 432 |
| 347 | 3 per cent. silicon. | 421 | .23 | 451 | .27 | .155 | .167 | 55 | .22 | 469 |

therefore imparted some of its other peculiar qualities.

The silicon is more effective than in Fig. 34, it taking one-half of one per cent. less silicon than in the former case to produce a given result. The extraordinary strength of the single bars of this mixture indicates what may be done by careful selection and mixing in foundry practice. The mixtures in Figs. 34 and 35 are what would be desirable for machinery castings and indicate the use of low grade pig-iron with low carbon and low silicon softeners; No. 1 pig-iron is a softener with silicon about 3 per cent.; it is, therefore, necessary to use more of it.

While testing samples, we found one white pig-iron with silicon 1.97 and shrinkage square bar 2.41, thin bar .235, dead load strength 566, deflection 19, impact 412, hardness 65, strongest bar 596, def. 20. On the other hand we have found a white casting of substantially the same chemical composition with silicon 2.74 that was very tender.

It is a very rare thing for iron to be high in silicon and still remain white.

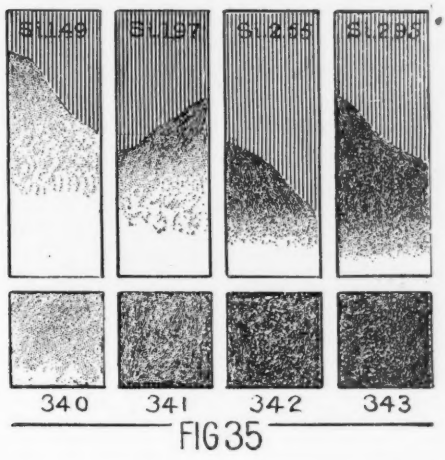


FIG 35

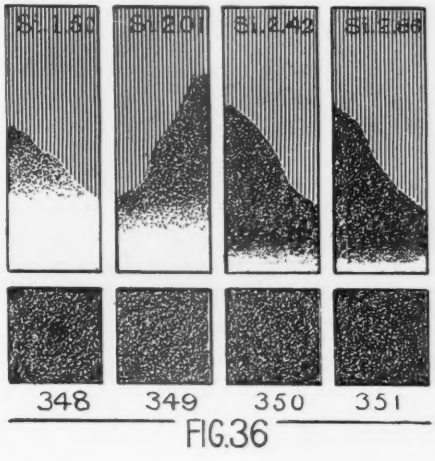


FIG.36

TABLE IV—(Fig. 35).

| No. Test. | Percentage. Silicon. | Dead Load. | | Impact. | | Shrinkage. | | Hardness. | Chill. | D. L. Strongest Single Test Bar. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength. | Def. | Strength. | Def. | Sq. Bar. | Thin Bar. | | | |
| 340 | 1½ per cent. silicon. | 501 | .19 | 486 | .27 | .179 | .243 | 65 | 1.25 | 540 |
| 341 | 2 per cent. silicon. | 464 | .22 | 390 | .20 | .161 | .217 | 57 | .60 | 475 |
| 342 | 2½ per cent. silicon. | 498 | .27 | 466 | .29 | .156 | .161 | 56 | .20 | 505 |
| 343 | 3 per cent. silicon. | 452 | .25 | 390 | .22 | .147 | .160 | 53 | .18 | 460 |

Fig. 36—(Table V) is a mixture of the gray pig-iron (441) with the low silicon pig (397) both having some tendency to chill.

TABLE V—(Fig. 36).

| No. Test. | Percentage. Silicon. | Dead Load. | | Impact. | | Shrinkage. | | Hardness. | Chill. | D. L. Strongest Single Test Bar. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength. | Def. | Strength. | Def. | Sq. Bar. | Thin Bar. | | | |
| 348 | 1½ per cent silicon | 362 | .23 | 345 | .25 | .162 | .175 | 58 | .40 | 375 |
| 349 | 2 per cent silicon.. | 363 | .23 | 334 | .22 | .156 | .158 | 45 | .22 | 365 |
| 350 | 2½ per cent silicon | 380 | .28 | 350 | .28 | .143 | .149 | 42 | .10 | 390 |
| 351 | 3 per cent silicon.. | 370 | .26 | 385 | .27 | .134 | .153 | 28 | .08 | 380 |

Fig. 37—(Table VI) is a mixture of the gray pig-iron (441) with the high silicon softener (401) which latter has no chilling tendency.

Graphitic carbon is a weakening element, especially if the grain be coarse.

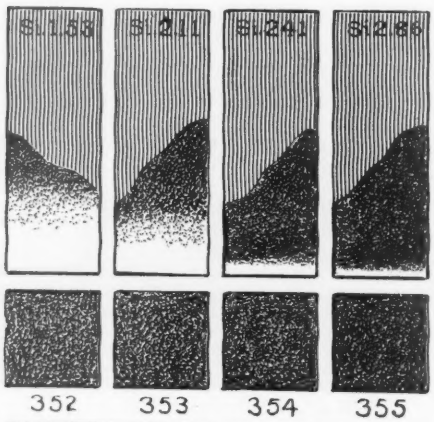


FIG 37

bars are prepared Saturday morning, and as we have more leisure time we complete the test Saturday afternoon, and if necessary change the mixture Monday.

We use from four to ten different irons in our mixture, counting Nos. 1 and 2 of the same brand as a different iron.

We have found by various analysis that we need about 2.75 per cent. silicon in our castings, and would prefer absolutely no chill.

From crucible tests the average strength of the pig-irons that we use would be about 350 pounds, and the average shrinkage would be .155, and the average chill about 0.04. From these irons in the cupola we wish to get an iron with shrinkage of square bar .125, thin bar .140, and with chill about the same as the average of the pig-irons.

To give an example of our experience when we began to test our iron several

TABLE VI—(Fig. 37).

| No. Test. | Percentage. Silicon. | Dead Load. | | Impact. | | Shrinkage. | | Hardness. | Chill. | D. L. Strongest Single Test Bar. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Strength. | Def. | Strength. | Def. | Sq. Bar. | Thin Bar. | | | |
| 352 | 1½ per cent silicon | 365 | .23 | 373 | .29 | .163 | .181 | 54 | .40 | 380 |
| 353 | 2 per cent silicon.. | 348 | .23 | 228 | .23 | .161 | .162 | 50 | .20 | 360 |
| 354 | 2½ per cent silicon | 318 | .24 | 277 | .24 | .141 | .149 | 39 | .07 | 330 |
| 355 | 3 per cent silicon.. | 348 | .30 | 401 | .32 | .148 | .148 | 42 | .03 | 355 |

We see that if we wish little chill and low shrinkage we must use pig-irons with low chill, and that shrinkages may be lowered by mixture more than can be accounted for by that of the original irons.

If softness, lack of chill and low shrinkage are of more account than great strength, gray irons will be selected. While silicon will control the whiteness yet some irons will carry more silicon than others. In our foundry the bulk of the castings are very thin, and we wish to keep the mixture uniform, and at the same time cost as little as possible.

We have no favorite pig-irons, but use what non-chilling irons the market affords.

We make a set of test bars each Friday from the middle of the heat. The

years ago, we found that it was rare to exceed 300 pounds dead load, but gradually raised the strength and at the same time found that the irons which had cost us most were not the best for us to use.

We ran for the first four months of 1892 very uniformly, varying but little from shrinkage square bar .125, thin bar .142, strength 390, chill 0.03.

On account of absence during May the iron gradually changed to about square bar .150, thin bar .152, strength 370, but the castings were pronounced strong and soft by those using them. Perceiving that the mixture was not quite high enough in silicon, we made quite a change so as to increase silicon. In two days shinkage was: square bar .130, thin bar .146, and in two more days: square bar .123, thin bar .142, strength

.396. We left this mixture practically unchanged until September 1st, when shrinkage was: square bar .114, thin bar .138, strength .390. Silicon was getting a little too high. A change lessening silicon slightly, brought square bar up to .126 and thin bar .141, strength 387.

We ran through to the end of the year with about: square bar .125, thin bar .143, and with D. L. strength from 370 to 450.

It was often necessary during this time to vary the mixture on account of a scarcity of some iron.

As we indicated before the kind of pig-iron used matters little if the results are satisfactory.

We have just heard that the strongest test bar from William Deering & Co.'s cupola iron thus far tested is 488 pounds, Keep's Test.

E. H. Mumford, foundry manager, Elizabethport, N. J., writes: The variation from day to day in a foundry product is due to variation in the fuel used and in the pig-iron.

We make daily use of Keep's Test.

1st. To obtain a record of the strength, deflection, shrinkage and chill of the castings made each day.

2d. To obtain such a record of the best mixture that we have used.

3d. To give prompt notice of any tendency in the wrong direction, and to indicate what is needed to regain the highest standard of excellence.

4th. Being entirely independent of prejudice in favor or against any brands of iron the cost of a mixture may be lessened while its quality is improved.

## BRASS AND BRONZE.

AMONG many mixtures we have seen printed from time to time, we select the following:

Brass for Locomotive Side Rods—Six pounds of copper and one pound of tin; to 100 pounds of this mixture add one-half pound of zinc and one-half pound of lead.

Brasses for Driving Boxes — The same as for side rod brasses.

Some master mechanics prefer harder brasses, and call for five pounds of copper and one pound of tin, one-half pound of zinc and one-half pound of lead.

Bells — Four pounds of copper and one pound of tin; to every 100 pounds of this mixture add one-half pound of zinc and one-half pound of lead.

Castings Subjected to Steam Pressure—Twenty pounds of copper, one and one-half pound of tin, one pound of lead and one pound of zinc.

Pumps and Pump Chambers — Eight pounds of copper and one pound of tin; to every 100 pounds of this mixture add one and one-half pound of lead and one and one-half pound of zinc.

Piston Packing Rings — Sixteen pounds of copper, two and one-quarter pounds of tin; to every 100 pounds of this mixture add one pound of zinc and one pound of lead."

Another authority gives the following:

Phosphor Bronze—Tough metal for piston rings, linings for eccentric rings, etc., 93 pounds copper, 7 pounds phosphor tin. For heavy machinery bearings, 85 pounds copper, 15 pounds phosphor tin.

Ordinary Bronze—Very tough, for eccentric straps, rods, etc., 90 pounds copper, 8 pounds tin, 2 pounds zinc. Very hard bronze, 80 pounds copper, 18 pounds tin, 2 pounds zinc.

Brass—A good metal for turning and filing is made from 70 pounds copper, 24 pounds zinc, 2 pounds lead. Soft yellow brass, 80 pounds copper, 20 pounds zinc.

Babbit Metal—Melt 4 pounds of copper, then add 24 pounds of Banca tin, 8 pounds antimony; this composition is called hardening. To each pound of hardening add 2 pounds of Banca tin; this will make the proportions for lining boxes 4 pounds of copper, 8 pounds of antimony, 96 pounds of tin.

## PLUMBAGO AND SOME OF ITS USES.

THE following are some extracts from a paper read by John Fraser Torrance, member of the Canadian Society of Civil Engineers before that body, December 9th, 1892, and as foundrymen are all more or less interested in the subject of graphite, we give a por-

tion of this most excellent paper space in our columns.

Plumbago, graphite or black lead is well known to all of us in its various forms of application as stove polish, foundry facings, lubricating powder, pencil leads, graphite grease, graphite packing, graphite paint, etc., etc.

It sometimes occurs in nature in flat hexagonal crystals, but generally it occurs massive or more or less radiated, foliated, scaly or compact. It is of a grayish-black color with an almost metallic lustre and a black shining streak. It is too soft to strike fire with a steel and it is a splendid conductor of electricity. Its specific gravity ranges from 1.8 to 2.24. It is composed chiefly of carbon; but usually it contains more or less alumina, silica, lime, iron, etc., apparently in mechanical mixture rather than in chemical combination. Next to the diamond it is the most incombustible form of carbon. For this reason it is used in combination with fire-clay for the manufacture of crucibles to resist the highest temperatures.

As far as I can learn, all the known deposits of plumbago of any economic value occur in rocks of Laurentian age. The only mine working on a large scale in the United States is operated by the Jos. Dixon Crucible Co., at Ticonderoga, N. Y. In a report by Albert Williams, Jr., of the United States Geological Survey on the Mineral Resources of the United States, it is stated that the deposit now being exploited is a bed of graphite schists fifteen feet thick, carrying from 8 to 15 per cent. of graphite. This is treated by a wet process, wherein the ordinary practice is reversed; the "heads" being the refuse and the "tails" being the valuable graphite. The average output is placed at 500,000 lbs., valued at an average of 8 cents per lb. at the works. Apart from this Company's output the North American trade is supplied almost entirely from the amorphous earthy deposit near Passau in Bavaria, and the large veins of graphite in the Laurentian gneiss near Travancore in Ceylon. But the finest pencil lead comes from the mines in Irkutsk, Siberia.

The Ceylon graphite is extracted from large fissure veins in the gneiss, which are completely filled by the graphite. It requires to be merely cobbed and sized before going to market. It is known as "dust," "chip," and "lump." Dust sells at 2½ cents per lb. in New York, chip at 3½ cents and lump at 5½ cents. It is used for all purposes except pencil-making.

The German black lead is far more impure, containing only 35 to 40 per cent. of carbon, the balance being of the composition of clay. But it is suitable for use in pencil-making. Very refractory crucibles are made by mixing 2 to 3 parts of this impure plumbago with one part of clay. Such crucibles will undergo 70 to 80 meltings in brass foundries, about 50 meltings with bronze or 8 to 10 meltings with steel.

The American and Canadian graphite is used for all purposes of the trade and excels all others as a lubricant. Many tests have proved this conclusively.

The quantity of plumbago, graphite or black lead imported into the United States in the year ending 30th June, 1891, amounted to 10,136 tons, valued at $509,809; while it increased in the following year to 13,511 tons, valued at $726,648. This shows conclusively that there is no danger of any properly conducted Canadian plumbago mine failing to market its wares, if it is worked economically and the output is thoroughly uniform and up to standard.

From the valuable report on the Mineral Resources of the United States published in 1884, I quote the proportions of the output, etc., devoted to various uses, as follows:

| | | |
|---|---|---|
| Making crucibles and refractory wares | 30 | per cent. |
| Stove polish | 30 | " |
| Lubricating graphite | 13 | " |
| Foundry facings | 10 | " |
| Graphite greases | 8 | " |
| Pencil leads | 3 | " |
| Graphite packing | 3 | " |
| Polishing shot and powder | 2 | " |
| Paint ½; electrotyping and miscellaneous ½ | 1 | " |

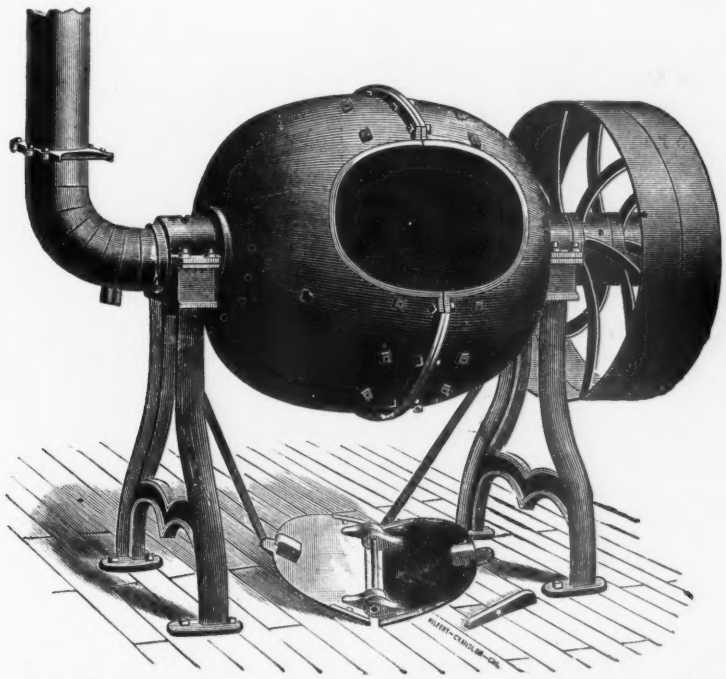
## A NEW FORM TUMBLING BARREL.

THE accompanying illustration is that of a new form of tumbling barrel manufactured by the Stover M'f'g. Co., of Freeport, Ill., and for

which several distinct advantages are claimed, among them being:

1st. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

2d. It requires less power, as the end motion causes the contents at ends to tumble into the center because of assuming the perpendicular earlier than those parts at the side.



3d. It runs with less noise because the contents are kept moving in two directions at the same time, doing away entirely with the intermittent motion so noticeable in other forms; doing away with gearing also lessens the noise.

It is lined with a sectional lining of hard iron, which can be cheaply and quickly replaced when woru out, making the barrel as good as new. A current of air is forced through the barrel by an exhaust fan, which removes the dust and carries it out through pipes arranged for the purpose, and the room is kept perfectly free from this nuisance. The workmen are thus enabled to do more and better work.

## FOUNDING AND METALLURGY.

### As Practiced in the Early Part of the Last Century.

Continued from March.

Translated from Reaumur for THE FOUNDRY by N. DANTERVILLE.

AFTER having tried everything that I thought would have any effect on iron and discovered those to reject and those which might be employed beneficially, it remained for me to try what effect would be had by a combination of those from which beneficial results had been noticed, and to determine from just what combination the best results were received, feeling sure that from all these experiments the most advantageous composition to use in converting iron to steel could not escape me. It is true the number of combinations which presented themselves seemed countless, but, after all, not so much so as might at first appear as we are obliged to advance

by nearly insensible differences to produce definite effects as physical precisions have sufficiently large latitudes.

From my previous experiments I had determined that the best materials for my use were powdered charcoal, ashes, soot from chimneys and sea-salt, but with these materials mixed in different proportions numberless compositions could be made; the one I thought the most powerful as an agent to transform iron to very fine steel consisted of two parts of soot, one part of powdered charcoal, one part of ashes and three-quarters of a part, or somewhat less, of sea salt, or if we use sixteen pounds of soot we should use eight of charcoal, eight of ashes and five or six pounds of sea salt. This composition was the best for the best kinds of iron, but other qualities of the latter were rendered by it very difficult to forge and almost impossible to weld, etc., for an iron of this description a less active composition was needed, and I found the following to work admirably: Two parts of ashes, one of soot, one of charcoal and three-quarters of a part of sea salt, or about the same as in the first. The last composition can, like the first, be employed with success on all kind of iron most suitable for making steel, like the other it converts the iron to good steel but acts more slowly and the operation is finished after a much longer duration of the same fire and for this reason the first composition merits the preference besides giving more degrees of firmness to the steel. From what follows it can readily be seen that we can always employ it boldly on different kinds of iron which it changes, however, to steel, sometimes difficult to manage, but we can remedy this at a cost but little in excess of the time and charcoal used. It is a common thing to wish to give an air of secrecy to recipes and compositions and peculiar methods and processes from which no deviation can be made, we would but be imitating them were we to neglect to say that between the two extremes of the mixtures we have just given there are an infinite number of means that can be successfully employed. We have stated with much exactness the methods of both the preceding formulas because it is necessary to give most workmen some fixed rule to work by, but the point we wish to make clear is that these two formulas prescribe the limits beyond which is not safe to go, to deviate from them is to run the risk of making steel difficult to forge, too coarse or taking too long in the operation. If for example we lessened the quantity of ashes in the first formula or desired to exclude it entirely we should rarely find kinds of iron that it would change to steel easily worked. If on the contrary we augmented the quantity of ashes too much, if we gave to it alone three parts of the composition and divided the remaining parts between the charcoal and soot it would require a much longer fire, use a much greater quantity of composition and even then we would only have a coarse steel, but when one takes a middling course between the two limits he will be perfectly safe. For example: One-third soot, one-third ashes, one-third charcoal with the amount of salt prescribed for other compositions, will be a successful mixture, but when iron can be secured with all the requisites for making a good steel the first will be the best for reasons indicated and if the iron lacks some of these qualities it is surer to use the second. This is sufficient to guide in practice, we shall only add as a rule, that the more oily matters there are in the composition the more risk of making a steel liable to crack or difficult to forge, the steel is also made more promptly.

It is the soot and charcoal which contain the principal amount of oily substances, one, therefore, diminishes their quantity by lessening the amount used of these two materials and increases that of ashes which is employed principally to moderate the effect of the other two, it also acts through its alkali salts but has not enough to produce the bad effect referred to in our remarks on the alkali of different salts. To convince me still further of the bad effect of using ingredients containing much oil, I soaked with oil of flax the materials of the first formula and the steel was rendered very difficult to work in a way that would not have been had the composition not had this addition of oil. The amount of sea

salt given is not so essential but that it might be varied, it might even be absolutely excluded but the operation would be longer as the salts contribute much towards accelerating it and adds to the hardness and firmness of the steel. If the salt is excluded there will be needed a greater quantity of the composition in proportion to the quantity of iron. The quantity of salt used can be increased, but if this is done beyond a certain point it becomes detrimental; if, for example, it is doubled, it is apt to render the steel full of cracks, either the salt causes this effect of itself or it quickens the action of the oily parts to influence the iron, although the increase of the salt never produced as bad effects with me as did the increase of oily substances.

I placed in a creuset some powdered charcoal without any other ingredient, but in great quantity in proportion to the weight of iron and this iron was changed to a fine steel but only after nearly double the time it took the first composition to produce the same effect, but this steel was full of cracks. The placing in either of my compositions of any neutral materials, such as potter's earth, sand or lime, arrested or lessened the effect of the active materials in proportion as I increased or lessened the amount of such neutral elements and while this is the effect that might be anticipated, it served to show that if the iron being operated upon became steel difficult to forge, it could be rendered more manageable by moderating the effect of the active materials by those of a neutralizing nature. If to one weak composition of two parts of ashes, one of charcoal, one of soot and three-quarters of a part of salt we add one part ordinary lime, or still better, one part bone lime, or bone burnt and reduced to ashes. I found I had a mixture that would serve when others failed as there are kinds of iron that by the aid of all other compositions I could only change to a steel which would not bear the hammer, yet by this last mixture I could make of them a steel easily forged. The using of neutral materials can be carried still further, I have sometimes converted iron to steel by mixing two parts of bone lime with one part ashes, one part charcoal, one of soot and the ordinary amount of salt, but after all it is best not to try to convert iron that requires these correctives in the mixture. If too much is put in it arrests totally the success of the operation. I have for example assayed a process reported in a book of secrets concerning the arts, printed at Paris in 1716, tome I, page 12, with which I did not succeed because the amount of quicklime is too strong in proportion to the rest. This process specifies one part soot, three-quarters of a part of ashes of oakwood, one-quarter of a part of crushed garlic, to be boiled in twelve parts of water until the twelve parts are reduced to four, in which the pieces of iron are soaked. They are stratified or arranged in beds separated by a composition of three parts charcoal, three of quicklime, one of soot, one-quarter of salt. This beautiful process left my iron very soft which I attributed to the great quantity of quick lime.

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The stove foundry of Hoyes & Goddard, at Waterville, N. Y., which was destroyed by fire recently, has been replaced by a new and commodious one, being 40 by 70 feet, giving them sufficient room to double their capacity.

The many friends of Mr. Isidore Rubel, of Rubel & Co., 114 Lake street, Chicago, will be pleased to learn of his marriage. The happy event occurred Thursday, at Chicago, the bride being Miss Flora Lindauer, one of the belles of the World's Fair city.

It is authoritatively stated that the Ivens Machine Foundry, at Decatur, will be put in operation about April 1.

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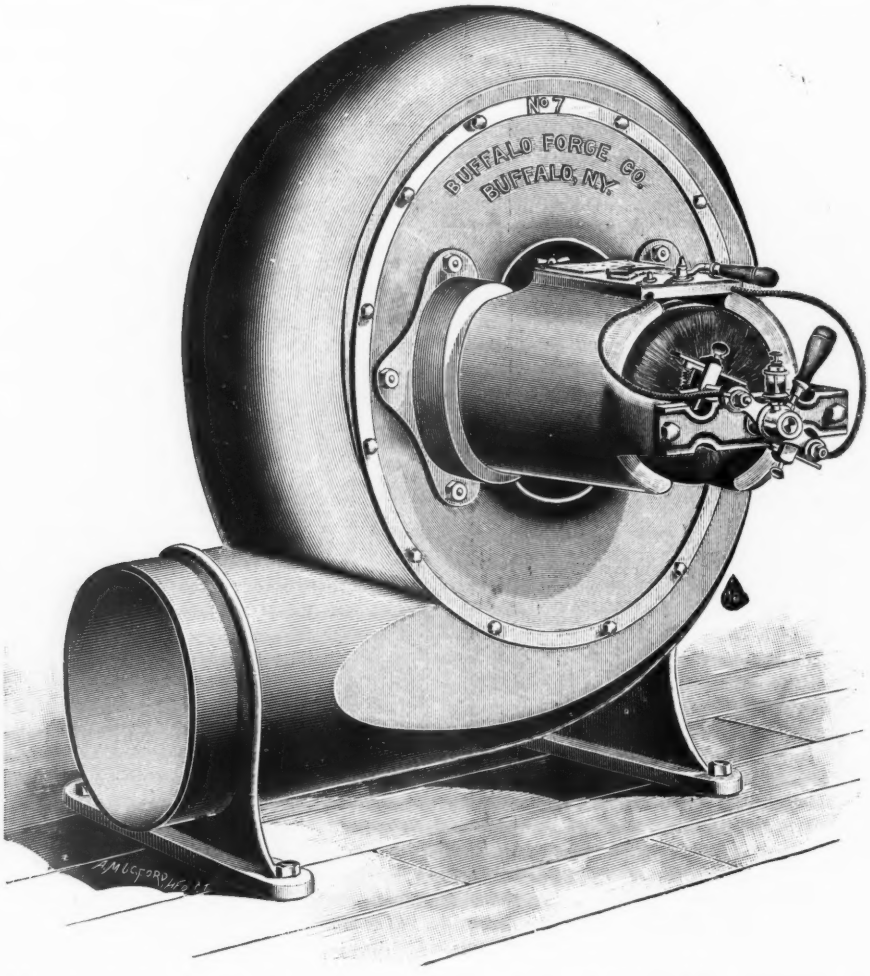
## AN ELECTRIC PRESSURE BLOWER.

THE accompanying illustration is that of an electric motor attached to a No. 7 pressure blower as manufactured by the Buffalo Forge Co., their No. 7 being capable of supplying blast to a cupola 35 inches in diameter.

The advantages possessed by a utilzation of electricity for such purposes

are, of course, easily apparent. There are no troublesome countershafts that must be located in just a certain position, and either affixed with much trouble to overhead beams or occupying valuable floor space. Belts never slip, require lacing or break just at a critical moment and it matters not to the electric blower just where the engine is located or whether the engineer or his engine have met with an accident. Trouble with the boiler does not prevent the electric blower from doing its work and it can be set in any convenient place without regarding any of the foregoing considerations.

It is claimed for this latest addition to the modern foundry that its manipulation is of the easiest kind, all that is needed being the movement of a handle to turn on the current and as their cost compares most favorably with the blower as ordinarily used, especially when the cost of countershaft, belting, fuel, power, attention, etc., are considered, we do not see why they should not come into universal use whenever blowers are required.




The Buffalo Forge Co. have several of these blowers doing electrical service and claim for them that they give the best of satisfaction.

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An addition of 60x20′ has been made to the Fulton foundry at 27 Furman street, Brooklyn, N. Y. One of T. Shriver & Son's electric traveling cranes has been added to the equipment.

# THE FOUNDRY

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

*Published Monthly by*

"The Foundry Publishing Co."

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S. E. WHITNEY, - - - - - VICE-PRESIDENT.
JOHN A. PENTON, - - - - - SEC'Y-TREAS.

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IF YOU FAIL to receive your paper promptly, please notify us.

THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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## OUR FRIENDS SHOULD BE YOUR FRIENDS.

READERS and friends of THE FOUNDRY are most earnestly requested to, as far as possible, favor those who by their enterprise in patronizing our advertising columns have enabled us in part to give our readers as good a foundry trade paper as we think all will concede THE FOUNDRY to be. All are reputable firms of the highest standing and can be relied upon to furnish first-class goods or articles. Were we not confident of this, they would not be with us, and in corresponding with them our friends will confer a favor by mentioning this paper.

## CULTIVATE THE GIFT THAT IS IN YOU.

WE wonder to how many of our readers it has ever occurred that while there is a great plenty of writers on almost every mechanical scientific subject, yet on foundry matters or those pertaining thereto, there is the very greatest dearth of original contributors, notwithstanding the wide range of subjects existing for discussion and the universal as well as important nature of the great foundry industry in America. To attempt to excuse this by asserting that there are but few capable of expressing themselves by the medium of pen and paper, would be casting a reflection on the business that would justly be quickly repudiated and we can only excuse it on the ground of indifference, both on the part of those well equipped to convey their opinions by that medium and those for whose benefit such articles are usually written.

We wish, however, to draw the popular attention to the fact that there is a greatly increasing interest being manifested in foundry subjects in all directions where a few years ago it and all connected with it were treated with much indifference. There are ten times as many readers of foundry literature to-day as there were five years ago, and he who can contribute his share to the general fund of knowledge will be received with marked attention and he is neglecting to "cultivate the gift that is in him" if he slights such opportunities. The very fact of writing causes thought, cultivates reflection and improves the mind, consequently benefitting the man as well as it does the audience, whom he can in this way address and make himself known. It is in a measure an education of itself, if continued, and we cordially invite our friends as far as possible

not to pass this by without at least making an effort to derive a benefit, which, if properly wrought, is sure to be theirs. THE FOUNDRY will be glad to assist and advise to the best of its ability and offers gladly the use of its columns as being by far the best medium to reach foundry readers.

## A GOOD IDEA.

"THE RURAL NEW YORKER," a well known agricultural paper is fathering a congressional petition asking for a revision of the law governing second-class matter, so that every publisher enjoying the second-class postal rate shall in every issue of his periodical publish a statement signed by the postmaster showing (1) the amount of postage paid for, (2) the weight of the preceding issue of said periodical.

Probably no law that could be enacted bearing on second-class matter would be as beneficial as the one suggested, as there are a horde of daily, weekly and monthly publications whose chief excuse for existence is to be found in the ability of the editor to make extravagant statements concerning the circulation, these statements in many, if not in most instances, being nothing more or less than down right falsehoods and their success being in a measure proportionate to their ability to deceive the advertisers. It is safe to say that such a bill stands no likelihood of passing. These papers would all unite their influence in bringing such pressure to bear as would influence our honest law-maker that it was unnecessary and it could only hope for success if advocated and pushed by the advertisers of the country who are the ones really most interested. Such a bill, if successful, would be the means of saving them money and give the respectable publications that charge an advertising rate in proportion to their circulation, equal showing with those who do not.

## MORE CARE WOULD PAY.

THE FOUNDRY is heartily in sympathy with the sentiments contained in the letter published elsewhere concerning the oft repeated statement that foundry proprietors are frequently negligent to an extent that is ruinous to themselves in the lack of good management displayed in the methods of conducting their business We see so many places where every convenience and even comfort surround the machinist, patternmaker, etc., and where in the foundry the sand is frozen, the windows without glass in places, a coke fire here and there that only serves to render the chilliness more apparent and a general air of disorder and discomfort, that those employed there can not be held responsible for, as long as the example is set them from higher quarters, all will concede that in no department is there the same opportunity for waste or good profit as in a well-conducted iron foundry, while in none is this opportunity so continuously slighted. The fact that a change has taken place to a great extent during the past few years does not alter the case as it only proves its necessity; foundry owners have at last reluctantly conceded that proper warmth, good light, and proper conveniences can no where be used to greater advantage than in the foundry and that it pays better to have a laborer do the rough work than a skilled mechanic.

If iron founders would invest a little more money in these conveniences and in an appropriate supply of such small affairs as good clamps, gaggers, flasks, ladles, etc., they would find the capacity of the average molder greatly enhanced and the quality of his work improved, enabling them to turn out more and better work, secure more of it and reap a greatly increased profit, and in nearly every case it will be found that the man who pays no attention to such matters can be classed the same as the man who attempts to do business without advertising. He thinks he cannot afford it, while in reality he of all others cannot afford to do without it.

A representative of THE FOUNDRY was recently shown through the pattern letter establishment of H. W. Knight & Son, at Seneca Falls, N. Y., and was greatly surprised at what he saw. All the letters are cast and beautifully finished. An immense stock is constantly kept on hand, 30,000 of the smaller and most salable letters are in their finished stock, and still more in the unfinished and they inventory 2,000,000 letters and figures.

A beautiful little letter which they call "Hair Line Gothic," something new, are so small and light that it takes 10,000 to weigh a pound, while others weigh 20 pounds a character.

They have the leading establishment in this country and supply dealers from Maine to California, also shipping to Europe. Recent shipments have been made to London and San Francisco. Address them for their catalogue, drawer 1156.

## TECHNICAL EDUCATION FOR THE MOLDER.

BY S. BOLLAND.

WE are told that technical education has for its object the training of persons in the arts and sciences that underlie the practice of some trade or profession, and embraces all kinds of instruction that have direct reference to the career a person is following, or preparing to follow.

Owing to the gradual breaking up of the apprenticeship system, the ranks of the skilled foundrymen have been woefully reduced, and must continue to be indifferently recruited from amongst the foreign workmen who arrive here, if something is not done at once to check the evil. The question naturally arises at this crisis, will the technical schools furnish the remedy?

A thorough apprenticeship means such instruction in the trade as will give the young man an intelligent knowledge of all its branches, but this means that he shall be gradually advanced, step by step, and receive special instruction and practice in each department, a system entirely at variance with what are now considered to be the best means for rapid production.

Under the old regime the boy received the fullest share of attention from his so-called "master," and it was reasonable to expect that he would be taught all which it was possible to teach, if the true spirit of the indenture was carried out. The "master" was bound to teach the boy all of his trade, omitting nothing. Under such circumstances every detail of the craft was learned, and on the termination of the contract, he who was the obedient apprentice, rightfully became the competent journeyman.

If we look carefully into the subject we shall discover that *production on a large scale* has been the means of inaugurating a new system of dividing labor. Now, this system works advantageously to the employer, because, keeping a boy constantly on one particular branch of the work, he naturally become more expert and the total output of his work is proportionately increased thereby. The result of his new order of things has been to limit the boy's ideas of molding to that particular part upon which he has spent his effort, to the exclusion of the greater part of what constitutes the full and legal measure of a journeyman's knowledge of the trade. In other words he is launched into the world a thoroughly *incompetent* molder, and there are to-day, hundreds of such graduating in the large pump, architectural and stove corporations in the foundries of which boys are kept at one job throughout the whole course of their servitude.

This apparently unpreventable condition of things has more than any other cause, created the necessity for technical education of a kind that will, if possible, not only train the minds of our youth in the arts and sciences underlying their trade, but also make good the deficiencies of such an incomplete apprenticeship, practically.

The possibilities attending a sound technical education are, we admit, very great, but it would be unreasonable to expect that the theoretical and practical could ever attain to the highest degree of excellence in the one individual. The requirements in each case are necessarily of a different order, each demanding special and distinct lines of thought and action, for which reason, the likelihood of such a union is rendered very doubtful. It must be conceded, however, that to the acknowledged advantage of a technical training, as affecting the molders themselves and the welfare of the foundry generally, we must add the certain improvement which must take place in the work produced, resulting from the superior and better trained intelligence of those who would be benefitted by such instruction.

Some writers have been uncharitable enough to suggest that this superior knowledge, once gained, would generate in the workman a dislike for the ruder and more active parts of his trade; the writer of this hastens to correct all such ill-timed and unwise conclusions, we have always found the opposite to obtain in every instance, the greater the intelligence of the workman, the more diligent he becomes. His superior knowledge imparts a stimulus to the

efforts he puts forth and the result of his labors, being manifestly in advance of his less intelligent fellow-craftsmen, meets with substantial and well-merited approval this, of course, is the legitimate reward and constitutes a fitting accompaniment to the inner satisfaction he enjoys. But rest assured, the molder possessing these superior attainments will not long remain in the ranks, he will undoubtedly be called into higher spheres of usefulness where opportunities will be afforded for a fuller and more effective display of his talents.

The fact that it is a matter of some difficulty to obtain competent foremen for some of the mammoth foundries now being erected is made more apparent every day. In order that there should be nothing lackiug in the management of such concerns, proprietors have, in many instances, been compelled to engage the servlces of an educated superintendent, whose chief business is to overlook the foundry generally and see that every action of the more active foreman is directed in channels which run in harmony with known physical laws.

Why the molders of to-day are incompetent for such positions is attributable to two causes, the first being the altered condition under which foundries are now being conducted, rendering it simply impossible for the ordinary workman to acquaint himself with all the details connected with the trade. The second cause will be discovered to be a natural result of the rude awakening experienced in the foundry interest generally, to the fact that they were wretchedly behind every other branch of the iron industry in the application of modern improvements, mechanical and otherwise, and in their pardonable haste to redeem themselves, appliances have been added, in such number and kind and with such precipitancy as to change the nature of things in the foundry altogether.

The suddenness of these late innovations has been almost bewildering in its effect upon the old systems of management, but if during the time this forced exodus of old-fogyism was taking place the foreman had been supplementing his daily shop practice with evening instruction in some well-conducted technical school, there is no doubt but he would have been equal to the emergency, as the knowledge there obtained of the new requirements would have qualified him to adequately fill the position, even with the increased responsibilities consequent in the changes spoken of.

We regret to see that, (excepting one or two noble examples) as yet, there does not seem to have been any genuine attempt made to make the foundry department in most of the existing schools equal to the requirements. We need never expect these schools to give the requisite instruction for overcoming the difficulties above described whilst the present system of choosing instructors is maintained. The latter mentioned dignitaries are, as a rule, woefully deficient in in all that pertains to a correct knowledge of founding, nor need we wonder at this when we consider that the salaries offered for such instructors are usually much below the remuneration a good journeyman molder receives at the foundry. The sooner this phase of the subject is thoroughly investigated by the authorities in these matters the better it will inevitably be for all concerned.

We have reason to believe that if more latitude were given the professors in selecting instructors of founding, a much better state of things would prevail. They would naturally look about for the most suitable person and offer such inducement as would be likely to secure the worthiest men for candidates. As matters appear to stand at present, the trustees of these institutions, whom we may surmise are as a rule unacquainted with the actual requirements for such a position, allow feelings of prejudice and mistaken notions of economy to prevail; as a consequence, instructors are appointed without reference to capacity, their chief recommendation being the diminutive compensation claimed for such valuable (?) services.

Foundry instructors should be unmistakably acknowledged masters of the art of founding and their education

should, at least, measure up to a standard that will enable them to explain in an intelligible manner, every operation involved in the production of all kinds of castings, as well as the concomitant qualities of a more executive order. The molder whose career has been a marked success in the foundry and who has graduated in the sciences directly bearing on his trade, at one of the schools, is undoubtedly one of the very best candidates for the position of instructor of founding at the techical schools, and none of the very questionable reasons above mentioned should be allowed to operate against the appointment of such candidates.

This degree of qualification can only be attained by men who, having realized the necessity of such attainments, have diligently studied the theoretical as well as practical part of their trade. It is in this very particular that the present technical school system offers perhaps the best opportunity yet known for the aspiring founder to advance himself.

A highly reprehensible feature in some of these institutions is the placing of one person to instruct in two or more departments. To expect that one teacher, no matter how extensively read he may be in the text books, can correctly teach several trades is preposterous, and decidedly wrong; such a system, if persisted in, must assuredly result in failure and disgrace. The engineer, no matter how profound and extended his general knowledge may be, would naturally shrink from the task of instructing a molder in all the niceties and perplexing phases connected with the art of founding, as would also the intelligent boiler-maker if he were asked to instruct a class in modeling, and yet it is a fact that such impossibilities are attempted, with what results we may readily infer.

We confess to being somewhat amused when we read and hear the constant complaint about "the inaccuracies of the average molder," but we happen to know that the slip-shod methods of working, so prevalent in some places, is mainly owing to the fact that ignorance of the real necessities of the foundry on the part of the management has tended to the withholding of such appliances as would insure the accuracy looked for, consequently for lack of encouragement the molder has been forced to invent some makeshift for the occasion, hence it is common to hear the expression "anything will do for the foundry."

The spirit of contempt for foundry needs and conveniences has at last received its death blow in the manufactories, as we have endeavored to show, but strange to say, it has again risen phœnix like in the schools, the very last place we should have expected to find it. Pass through the several departments of the general order of technical schools and you will find that the equipment is on a grand scale for almost every section except the foundry. The engine room is a model of perfection, as it ought to be, the fitting, turning and general machine rooms are elegantly provided with the most modern machinery, the forging department has all that could be desired to make it of real service, whilst the carpenter and other wood working sections are lacking in nothing to make instruction effective; last, but by means least in importance, is the foundry, where we find almost everything narrowed down to a mere shadow of what ought to exist in this department if they are to be made of any practical benefit whatever.

The young men from our foundries who are anxious to supplement their daily practice with such instructions as might very readily be given in these schools are instantly provoked to laughter when they first contemplate the meagre and insufficient means usually provided for illustrating the art of founding, in some instances not going beyond the antiquated sand tub of our respected forefathers with a few small flasks which bear no resemblance whatever to those used in actual practice. This, in conjunction with the very indifferent cupola arrangements constitutes in some schools what is considered sufficient for foundry instruction. Such means are undoubtedly inadequate for any other purpose than to furnish occasional amusement to the general order of students, who have not the remotest idea of ever engaging in the business of founding.

These excellent institutions may be made invaluable to the molder, if the regularly constituted authorities can be brought to grasp the situation. No general treatment will answer his case fully, there must be a special and clearly defined course of instruction excluding all subjects which have no direct bearing on the subject of founding. This special education should include chemistry, because by its aid much of the phenomena incident to foundry practice, which to the unlearned is still a positive mystery, can be made plain and intelligible, a knowledge of this science would so change the order of things as to make what has heretofore been a monotonous drudgery, an extremely agreeable occupation. Another important result of this increased intelligence would be a sensible diminution of the failures and loss incident to practice founded on nothing more than the merest chance.

The need for a more extended application of the science of chemistry is being forced on the founder in some way or other constantly. Chemists whose occupation has been in line with the foundry, are now telling us that the methods usually adopted for ascertaining the nature and quality of pig-iron are untrustworthy and must ultimately give place to the more scientific mode of analysis; the latter method, they claim, will enable the founder to determine the mixture from the analysis furnished by the makers, before it is charged into the cupola, to a certainty; because having a knowledge of the properties common to the several elements present, he will be able to blend the several brands in such proportions as will produce desired qualities in the resultant mixture.

A practical demonstration of this and other theories could be readily made in the technical schools by successive mixtures melted in crucibles, the formula for each mixture could be changed and a record kept of the changes caused by the varying quantities of the several elements entering into each test. The physical results, such as hardness, fluidity, chill, shrinkage, strength, etc., could be satisfactorily determined by Keep's Testing Machine, a knowledge of the use of which should be taught at every school of technology.

Some natural philosophy as well as mathematics must enter into this special course, in order that the laws relating to combustion, pressures and numerous other kindred subjects, but very imperfectly understood by the great army of molders may be more generally known amongst them. All this will tend to sharpen the inventive faculties and give zest and energy to minds which must otherwise remain comparatively dormant.

Whilst it must be admitted that the general equipment for the technical school cannot possibly equal in magnitude or variety that required for large foundries, it cannot be denied, that to be of any practical service whatever, all such equipment should contain all the elements suitable for a practicable demonstration and thorough illustration of every department of the trade by the instructor.

The cupola, for instance, should not be smaller than 24 inches inside diameter, plain in design, but provided with the best furnishings in ordinary use. The reasons for suggesting a plain cupola are, that more of that kind are in use than any other, and comparisons with improved specimens can be more readily made, also they are better for experimental purposes.

Instruments for ascertaining the amount of friction, pressure, etc., in blast pipes and all the phenomena connected with melting, should be provided and their use fully explained by the instructor. The cupola would be the place where the instructor could in the most effective manner teach sound views based upon actual practice and experiment, regarding the economy of fuel; what is meant by perfect combuston, and how it is brought about in the cupola; the importance of supplying the exact quantity of air to secure best results, and how to correctly measure the same, etc.

*To be Continued.*

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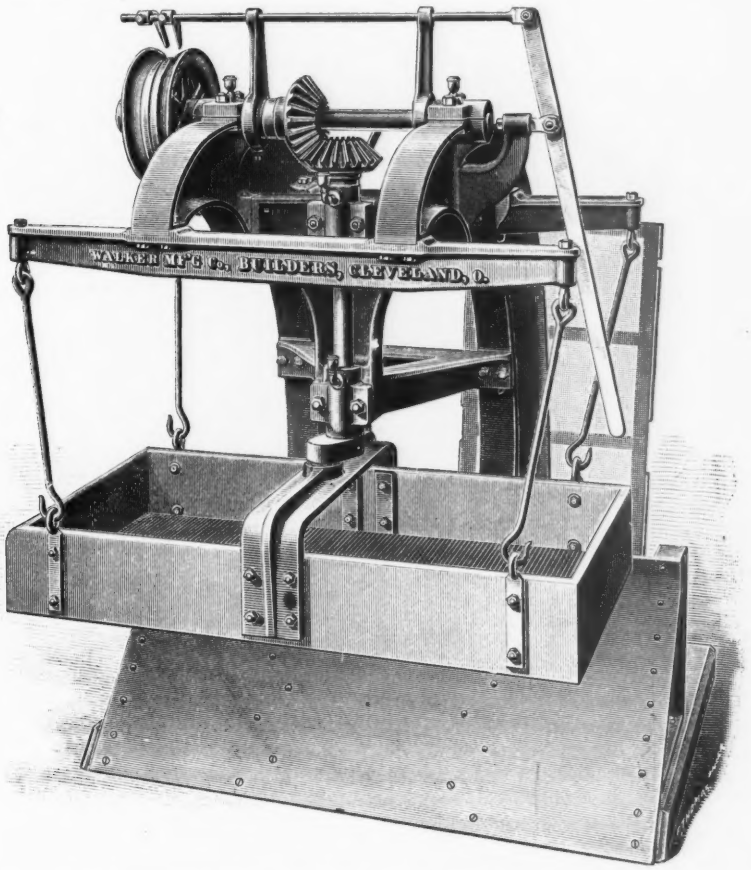
The J. S. McCormick Company of Pittsburg, Penn., is putting in new machinery, which will about double their capacity for the manufacture of foundry facings.

## A POWER SAND SIFTER.

MR. JOHN WALKER, Vice-President and General Manager of the Walker Manufacturing Co., Cleveland, O., has added another to the already long list of patented appliances with which his name is so inseparably connected and which had for their object the facilitating of the foundry business. This time it is a power sand lifter, illustrated herewith, and is something that has long been needed in foundries of the larger class. It is designed to make 120 to 130 revolutions per minute, and to perform an amount of work equal to the hand labor of at least four men. It is not only powerfully built and symmetrically proportioned, but it is so constructed that it can be used either as a fixture or carried to the molds or precise location where the sifted sand, etc., is required. Moreover the machine can be driven either by a 3″ leather belting or 1″ rope—the latter being preferable—since by this method it can be operated at any angle relative to the line shafting; by the application of specially designed, universal mechanism with swivel bearing and tension arrangements. Another commendable feature is that it is practically noiseless while a still greater advantage is that all the machinery is above the falling sand. Each sand sifter occupies a floor space of about 5 ft. 8″x5 ft. 6″ and is provided with four pair of screens or riddles 4 ft. 8″x2 ft. 3″ the size of meshes for each pair being Nos. 16, 8, 4 and 2, respectively. Additional intermediate sizes in galvanized iron or brass can be supplied at reasonable prices.




As an example of the amount of work it will accomplish we applied the following table which shows the quantity

EXPERIMENTAL TEST.

| Size of Meshes. | Time. | Stops Made for Clean. Ridle. | Cubc yds of sand siftd |
|---|---|---|---|
| No. | H.M. | | |
| 2 | .25 | – | 5 |
| 4 | .45 | – | 5 |
| 6 | .55 | 2 | 5 |
| 8 | 1.15 | 3 | 5 |
| 16 | 2.40 | 6 | 5 |

of sand, dampened to the proper consistency for molding which can be put through in a given time. The quantity sifted, is, it will be observed, in all cases the same, viz: 5 cubic yds., and as a cubic yard about equals a wagon load, it is seen that the machine will put five wagon loads through a No. 4 mesh riddle in 45 minutes, which is really surprising. Five of these machines can now be seen in operation at the foundry of the Walker M'f'g. Co., Cleveland, Ohio, where great economy and utility are claimed for them.

We understand that the company is offering them at a very reasonable price to those who are desirous of improving their equipment and THE FOUNDRY thinks they ought to meet with universal favor as a substitute to the old back-breaking method.

## NEW YORK AND VICINITY.

Between thirty and fifty foundrymen have died in New York, Brooklyn and Jersey City since the present year began. Pneumonia seems to have been the cause generally.

The A. A. Griffin Iron Co., (steam and hot water heating apparatus, sole manufacturers of the Brundy patent, direct and indirect radiators) Jersey City, N. J., have built two additions to their foundry department within the last three months. On the north end the extension is 105x25′, the wing on the west side is 75x60′. Comment on their business seems unnecessary. Over one hundred tons of iron is cast daily.

The foundry of Mr. Henry C. Fischer is rapidly assuming a prominent position amongst the architectural foundries of Brooklyn, N. Y. Recent improvements consist of an extension of 80x50′, a new cupola No. 5 Baker Rotary Pressure Blower and several pits for casting large square columns. The new addition to the foundry makes the dimensions 160x80′. The cupola was designed by Mr. Fischer, it has 66″ shell and is lined up to 49″. Mr. Loyd Bryant, the foreman, is well satisfied with the results obtained and feels confident the saving in overtime will soon pay for the cupola.

Lemuel Piggott & Co,, have started a jobbing brass froundry at 33 Nostrand avenue, Brooklyn, N. Y.

Messrs. R. Hoe & Co., contemplate an extensive improvement to their foundry at Grand and Sheriff streets, New York City.

The Tuttle & Bailey M'f'g. Co. have built an extension to their foundry at North Eleventh streeth, near Wythe avenue, Brooklyn, N. Y.

The American Steel Wheel Co. are building a foundry and steel plant on the main line of the Jersey Central Railroad, about 20 miles from New York.

Mr. Samuel Metcalf has recently erected a traveling crane in his foundry yard at Seabring street, South Brooklyn, N. Y., which greatly facilitates the work of handling castings, fiasks, etc. It is claimed that he was the first one (in the Eastern States, if not the entire country) to operate a steam traveling crane in a foundry. The one in question has been in use for thirteen years. Its capacity is ten tons.

## PHILADELPHIA AND VICINITY.

The Abram Cox Stove Co. are erecting in connection with their other immense buildings at American and Dauphin streets, Philadelphia, a mammoth warehouse six stories high, to contain a storage capacity of 100,000 square feet of space. They contemplate carrying a stock of 4,000 tons of castings and it will require the use of seven elevators. Taken together with their other warehouses they will have storage capacity equal to any in the country.

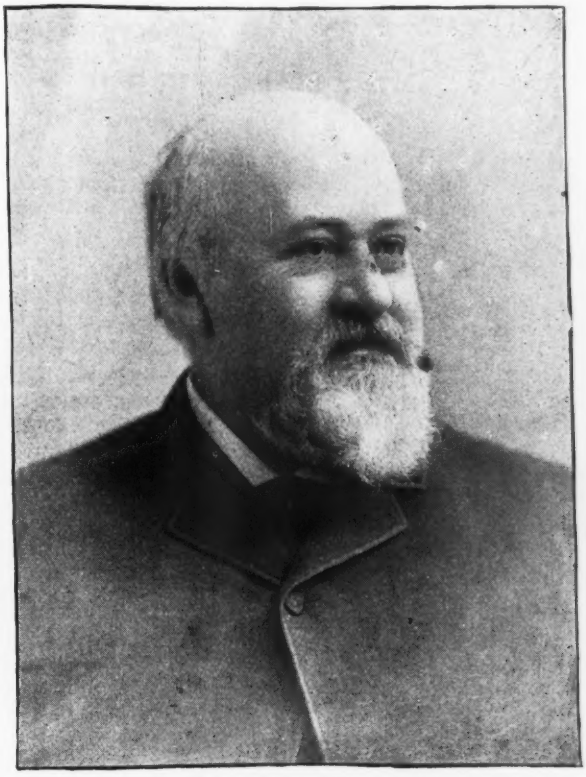
The Phœnix Iron Co., of Trenton, N. J., have resumed business with Mr. W. D. Haven, president and treasurer and Mr. H. J. Parker, vice-president and secretary. In March, 1892, an assignment was made for the benefit of the creditors and we are told they now resume with ample capital, obligations all cancelled and fully equpped to execute all orders promptly.

Mr. John Dermody for many years foreman of the foundry of the Neafie & Levy Ship and Engine Building Co., of Philadelphia, has started a general foundry here and will make a specialty of propeller wheels.

## D. J. MATLACK.

AMERICA and Americans can feel no small amount of pride in contemplating the strides that have been made during the past 25 years towards placing this country in the first rank among the manufacturing nations of the world and in viewing the really phenominal progress that has been made during that period in every American industry, especially those in which the iron and steel workers have been an imposing figure.

Prominent among the list of those names who have helped to earn for America laurels that were originally monopolized by Old World nations, we find that of D. J. Matlack of Philadelphia, and while patriotic citizens generally can always rejoice and feel pride over such a possession, in this case the foundry world and foundry men especially, have reason to feel proud that the subject of our sketch is one of them.



MR. D. J. MATLACK.

Mr. Matlack was born in Philadelphia in Sept., 1833, and is consequently nearly sixty years old, although to see him moving with sprightly tread among the vast mechanical structures with which he is continually surrounded and which are in part the result of his genius, he would be taken for a much younger man. He entered the old established firm of I. P. Morris & Co. as an apprentice in February, 1849, and after serving his apprenticeship remained there as a journeyman, being made foreman in 1863, and a member of the firm in 1875, and has gradually won his way to a prominent position among the foremost of America's mechanical engineers.

Anyone acquainted with the class of work made at this celebrated establishment during the past few decades will realize something of the ability of the man who has aided in making these things possible. Mining work of the heaviest class, mining engines for our largest steamships, including latterly the engines, etc., for the many American iron-clads recently erected by the Cramps (who have acquired an interest in the I. P. Morris Co.) and much larger work of a similar nature have aided in making the foundry of more than national reputation and for many years without any real rival in some respects. Mr. Matlack is a member of the American Society of Mechanical Engineers, in whose proceedings he takes much interest besides being in a small way, a farmer, at his beautiful residence at Longhorn, Pa., where the busy foundryman of the day finds relaxation roaming during his leisure hours among his gardens and watching with interest his horses, cows, etc.

No greater tribute to the worth and ability of Mr. Matlack could be made than that he is frequently consulted by others prominent in his own business on matters of importance concerning it and the fact that he is highly esteemed by those under him as well as his business associates.

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We have received from J. A. Willis, manufacturer of Tozer Engines, Columbia, S. C., a neat pocket-book, calendar, etc. Thanks.

## AMONG THE MAGAZINES.

The April issue of *Lippincott's* is mainly devoted to Columbus and the Exposition. The complete novel, "Columbus in Love," is by George Alfred Townsend ("Gath"), and narrates fully and feelingly the great discoverer's relations with Beatrix Enriquez. The leading persons of that day in Spain, and some of the chief scenes, are introduced,—Isabella, Ferdinand, the court, the bishops, the fall of Granada, the Inquisition; as well as those most closely associated with the Genoese,—the faithful Nunez, the good prior of Rabida, Pinzon, the sailors, and many more. The canvas is crowded, and those who will may here make enlarged acquaintance not only with the surface of Spain at that eventful era, but with the spirit of the time and the heart of its greatest man. The novel is fully illustrated.

William Igleheart tells "What the Publicity Department did for the Columbian Exposition." A portrait of Major Moses P. Handy accompanies this article.

Julian Hawthorne attempts "A Description of the Inexpressible,"—the buildings of the Fair; and Frederic M. Bird characterizes "The Religion of 1492" and that of Columbus.

The non-Columbian papers include one by Edgar Saltus on "Sappho"; an instalment of M. Crofton's "Men of the Day," covering J. A. Froude, Gounod, Dr. Farrar, General Howard, and Congressman Holman; and an illustrated tale by Annie Flint,—"Abraham's Mother," which is the second in the series of Lippincott's Notable Stories.

The poetry of the number is by Florence Earle Coates, Owen Wister, and Robert Loveman.

WHAT WOULD YOU DO?

If assured by scientific men that the world would come to an end within the next twelve weeks? The long promised novel of Camille Flammarion, "Omega: The Last Days of the World," proves to be of thrilling interest. It is the conception of one of the world's most distinguished astronomers, worked out within the bounds of scientific possibility. While educating the reader in the most modern phase of science, it is as full of interesting surprises as The Arabian Nights Entertainment. The most interesting part of this wonderful novel is found in his description of the trepidation and expectation into which the people of the world are thrown. Imagine the condition of the stock exchange with a fact of such import staring them in the face. The opening chapters will be found in the April number of *The Cosmopolitan* magazine.

Probably no novel has been presented in an American magazine with such illustrations as accompany Flammarion's "Omega," which commences in the April *Cosmopolitan*. In the list of illustrators are to be found the names of Jean Paul Laurens, Rochegrosse, Chovin, Vogel, O. Saunier, Gerardin and Meaulle.

The April number of *Outing* is as bright, cheery and seasonable as a spring day. Eighty pages of pleasant fiction, tales of sport with gun and rod, and of travel and adventure, embellished with many beautiful illustrations form a delightful number. The contents are as follows: "In the Shadow of Nineveh," by Wm. Hinckley; "Sport with Canada Geese," by Ed. W. Sandys; "Canoeing on Concord and Merrimac," by J. N. Drake; 'Hunting a Tapir," by Allen Chamberlain; "A-Wheel to San Gabriel at Easter," by "Jess"; "Through Erin A-Wheel," by Grace E. Denison; "Feathered Dancers," by J. M. Murphy; "Long-distance Riding," by Capt. H. Romeyn; "The Yachting Outlook for '93," by Chas. Ledyard Norton; "Miss Caruthers' Partner," by Annetta J. Halliday; "Walking," by Malcom W. Ford; "Two Trout," by John H. Keene; "A Spring Week of Outings," by Lucy E. Keeler; "Lenz's World Tour A-Wheel;" "The South Dakota National Guard," by Capt. Peter Leary, Jr., U. S. A., and the usual editorials, poems, records, etc.

*Godey's Magazine* for April, 1893, contains as a frontispiece a water color portrait of Her Highness, Victoria Mary, Princess of Teck.

Light Out of Darkness. Complete Novel by Mrs. Henry Ward Beecher. Illustrated by R. F. Zogbaum.

A Sahara Picture—*Poem.* By Daniel Doane Bidwell.

The Home—Conducted by Mrs. Henry Ward Beecher. Schools and Schools, by Lydia S. Cody. Luncheons and Teas, by Eva Marie Kennedy.

Paris Wet: A Walk with Jacques. By Eleanor E. Greatorex. Illustrated by the author.

Portrait, Mr. and Mrs. Henry Ward Beecher.

I Saw Them Do It—*Song.* Music by C. B. Hawley. Illustrated by C. H. Warren.

The Earliest Stage Costumer. By L. L. Lawrence. Illustrated.

At Dusk—*Quatrain.* By Grace Fitzhugh.

Sketch of Her Royal Highness, Princess Victoria Mary of Teck.

Sketch of Mrs. Chester W. Chapin.

Water Color Portrait. Mrs. Chester W. Chapin.

Flower Talks. By Laury MacHenry.

The Truth About England. By S. P. Cadman.

Dissillusion—*Poem.* By Her Royal Highness, Princess Amelia, Daughter of George the Third.

Music in America. By Herbert Wilber Greene.

April—*Poem.* By Joel Benton.

Philip and Fillippo. By Clara Sprague Ross.

The Romance of A Miniature. By Wentworth Salvin.

All The Books. Reviewed by John Habberton.

The Search Light. *Editorial*

Sense and Nonsense. By W. J. Lampton.

Godey's Fashions Illustrated.

A new addition of 5,000 copies of the February *Century* is now printing. The demand for the magazine this season has been very great. The publishers were for a time entirely out of the January number; and they are now printing this new edition of February which has been for some time out of print. The March edition, which had already been increased, proves still inadequate, and yet a larger supply is in preparation for April. Among the recent attractions in the *Century* has been Mrs. Burton Harrison's story "Sweet Bells out of Tune," Mark Twain's "Million Pound Bank-Note," the reply of the Russian Secretary of Legation to George Kennan, Gen. Sherman's Correspondence with his brother, Senator Sherman, the remarkable Reminiscence of Napoleon at Elba, etc., etc. The April number will contain an important article on the trial of the Chicago Anarchists by Judge Gary, who presided.

The April number of the *New England Magazine* contains a variety of good things, among others two valuable political papers on topics of vital interest. The number opens with Phillips Brooks' historical sermon on Trinity Church, which now, for the first time reaches a wide audience. It is finely illustrated with portraits of all the pastors of the church back to pre-revolutionary days, and with reproductions of the maganificent stained windows of the present edifice, and sketches of the exterior and interior. This is supplemented by the description of Trinity, written by H. H. Richardson, the great American architect. Benjamin Kimball gives an account of the work of the Boston Camera Club, which will attract all interested in the development of photography as an art. The article is admirably illustrated with examples of the best work of the club. Raymond L. Bridgman ably considers the objections to "Biennial Elections and Legislative Sessions," and decides that the requirements of modern social life demand the maintenance of the *statu quo.* Georgianna A. Boutwell shows how much Americans owe to Silas Deane in their struggle for liberty—a debt that was not paid by his contemporaries, and only tardily acknowledged in history. Her paper is "Silas Deane and the Coming of Lafayette." Professor Arthur Latham Perry, the veteran advocate of free trade in America, contributes a notable paper, "Plain Words on Protection." Frederick J. Shepard describes the city of Buffalo. Joseph Percival Pollard, a young Chicago writer who is rapidly making a big reputation as a short-story writer of the intensely modern school, contributes a striking study, "The Convict Who Escaped." Lynn R. Meekins, one of the editors of the Baltimore *American*, whose short stories dealing with phases of political life have attracted wide and favorable attention, is represented by a story in his best vein, "Andy Rick's Handy Tricks." Minna Irving contributes a seasonable and really fine poem, "An Easter Prayer." Charles Gordon Rogers in "The Kiss of Children," goes straight to thousands of hearts. Mrs. Helen Campbell's serial, "John Ballantyne, American," is continued.

## BOOKS, EXCHANGES, CATALOGUES, ETC.

Whitehead Bros. Company, of New York, Providence, R. I., and Buffalo, N. Y., are mailing their friends a neat glass paper weight, which, of course, carries with it some reminders to the effect that they are dealers in various articles such as fire sand, brass sand, clay, foundry facings, supplies, etc.

The Yale & Towne Co., Stamford, Conn., have issued the neatest thing we have seen in the way of a beautiful little book printed in colored inks, illustrated with half-tone engravings, bound in cloth with embossed cover, descriptive of the beautiful hardware specialties manufactured by them and which are so extensively used for decorative purposes in houses of the better class.

J. W. Paxson & Co., foundry supply and equipment dealers have issued a supplementary catalogue of equipments for iron, brass and open hearth steel foundries and referring especially to their line of ladles, both crane and hand, for iron or steel blowers, sand sifters, tumbling barrels, clay mixtures, crucibles, flasks, pins, etc.

The James Reynolds Manufacturing Co., a new concern in the molding machine line, send us a neat and attractive catalogue in which they modestly set forth the merits of their drawplate and sand pressing machine. Being practical brass molders each machine is guaranteed. They have recently erected two additional machine rooms, boiler house and engine room and put in a new boiler and engine, made necessary by the large demand for their machines, particularly in the West, amongst which are the most extensive malleable and gray iron foundries.

The Gobeille Pattern Co., Cleveland, Ohio, are always doing something original. Their latest is a reproduction of a couple of letters written to them recently by Geo. R. Elder, C. E. The first one is signed by Mr. Elder as manager of the Johnson Company, Johnstown, Pa., and reads as follows: "The way you handled our work both in cost and quick delivery has been eminently satisfactory. It is doubtful if ever before in this country there has been given out a single order for patterns approaching the one you have had from us for the Third Avenue Cable Railroad, New York City. No other shop of which we have any knowledge could have handled it at all. You may refer to the writer whenever you think such references will benefit you." And the second is Mr. Elder's consent to their using the letter which evidently was not originally intended for publication. As this one job of pattern-work amount to sixteen thousand four hundred and seventy-seven dollars ($16,477.00) it speaks well for theGobeille Company.

The Berlin Iron Bridge Co., of East Berlin, Conn., have secured the contract for the new buildings required by Wm. Cramp & Sons, Ship and Engine Building Co., Philadelphia, Penn. The Berlin Bridge Co. have lately completed a boiler shop for the Cramps, and now have a contract for all the other buildings required to enlarge their plant. The new buildings will consist of a ship shed 60x100 ft., a black board 75x200 ft. and a bending shed 86x 150 feet, constructed throughout of iron.

## HE PROTESTS.

MY experience of twenty years in the foundry convinces me that there is not the same amount of interest taken in the molder that is taken in the machinist, and in my opinion the loss comes home to the employer.

In the majority of foundries, when a molder first finds employment, ten chances to one he has to clean up a pig lead before he can get any molding done, and when he has got fairly started he cannot find any gagger, nails or clamps, and sometimes he has to wait until his side partner is done with his rammer before he could begin to ram his mold. Now, all this could be avoided with profit to the employer and some comfort to the molder if the foreman would only look a little further ahead.

What a contrast to the above is the start of the machinist, his foreman gives him a job, tells just what is wanted, brings him files and gives him a fair start, and should he want a round file his foreman does not hand him a square file and tell him to do the best he can with that. With the close competition in the foundry industry at the present time, the cry is heard, (when a job has been taken from a firm) I don't know how they can do it, there is no money in it for us at that price. If, instead of trying to place the blame on the molder, they would look around and find out just where the fault lay it would be more to their advantage. Not long ago I was in a foundry where they make architectural castings and the employer was complaining that there was nothing in the business. He spoke about some columns he was making, and I here use his own words, "it takes that man two days to make that column and by the time I have it turned off, painted and delivered on the building there is not much money in it for me." I quite agreed with him, but there is a foundry not five blocks from where we stood that could and has turned out the same column in one day and I suppose that man is still wondering how it is that there is no money in the foundry business for him. In conclusion, give your molder plenty of tools to work with, gaggers, nails and good boxes with a good start in the morning, as an hour in the morning is worth two in the afternoon.

New York. A. H.,

The steel foundry at the River Works, at Lynn, Mass., will soon be turning out steel castings, as the furnaces are now in first-class shape, and castings will be commenced in a few days.

# Questions and Answers.

Replying to the questions asked by the writer. If it effects results in iron melting or melted? As to size of cupola, depth of teuyres or distance of blower and size of blow pipe from cupola, &c.

The following is offered as theory of the writer:

1st. We believe that the same mixture of iron melted in a 60" cupola will be milder and softer than if melted in a 26" or 32" cupola, for the reason that the entrance of the cold air into the 32" cupola comes in contact with a larger per cent. of the dropping and accumulating melted iron than in a 60" cupola, and the tendency is, of course, to render it closer in grain and harden it.

2nd. We believe that a cupola with teuyres 26" or 30" above sand bed will produce softer metal from the same mixture than if there is but 8, 10 or 12" between sand bottom and bottom of teuyres in the cupola with high tueyres. The metal in its transit from melting zone (we will call it) to bottom comes in contact with more fuel and absorbs or takes up graphite, or has the combined carbon changed into graphitic carbon, from heat from the fuel and also from being kept longer in large quantity. Before tapping this is assuming, of course, that the fuel is of good quality, free from sulphur.

3rd. As to length of blow-pipe, of course, it is well known that certain amount of fuel requires a given quantity of oxygen to produce perfect combustion, and it don't matter how it gets there.

The writer has had several instances brought to his notice, that where the fan was 30 or more feet away, the cupolas so situated always were good lively melters, and it would seem that same length, say 30 or 50 feet of blow-pipe, and made from two to three times the area of outlet to blower would act as a reservoir of air and would relieve the fan and have less wear and tear to belts and consequently produce a uniform resistance to the power required to run the fan.

One of the best melting cupolas the writer ever saw was made from an old boiler with fan 75 feet from the cupola. This cupola I was told was lined up 30", and the manager informed the writer he had melted 6 tons in it in a little over an hour. What he may have considered a *little*, I don't know, "but certain it was that it would melt very fast."

To the enquirer who asks what size teuyres to put in a 30" or 22" cupola, I would recommend that when he has selected the fan or blower, the size required, that the area of tueyres be made three times the size of the opening of the blower, it will do no harm and as the tueyres of a cupola begin to close up as the heat proceeds he will be able to continue heat longer with a margin of opening in his favor when he starts the heat.

Yours respectfully,

L. C. JEWETT.

J. R. S. wants to know the easiest method to find the weight of a column 10 feet long and 1½ inches thick, 14 inches in diameter, also number of inches a circle would contain supposing the diameter was 30 inches.

A. E. S. says that he is using flour and sand for cores and columns and finds them rotten and easily broken and wants a remedy. If good sharp sand is used and a proper amount of flour, cores can be made as hard as bricks almost, and A. E. S. must give us more particulars, tell us more of his sand or send us sample. He asks also what is the best fuel and what is the best plan to heat a core-oven 10x12 feet and 8 feet high. We would only say natural gas was the best fuel and failing to get that use good coke, and for a cheap inexpensive method of heating, build a grate level with floor of core-oven, with door and ash pit accesible from outside. There are, of course, better methods, costing more money, if A. E. S. wants them let us hear from him.

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The North Shore Traction Co., of Lynn, Mass., have placed the contract for their new car shed with the Berlin Iron Bridge Co., of East Berlin, Conn. The building will be 103 ft. in width and 300 ft. in length, constructed entirely of iron and brick in order to have the station fire-proof. The same company are also making an addition to a car shed for the Wilmington City Railway Co. at Wilmington, Del.

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I think the foundry business can and should support a paper devoted to its interest. We, as founders, are away behind the times in point of literature compared to other branches of the iron industry.

WM. MCADAM,
Norwich, Conn.

## RIGHT UP TO THE TIMES.

A REPRESENTATIVE of THE FOUNDRY recently visited the various foundry departments of the Yale-Towne Co., Stamford, Conn., and was surprised at what he saw there in the way of the care taken to insure the finest and best of work in all departments. Every casting is required to be as nearly perfect as the molder's art, supplemented by the best of materials and appliances can make it, and the smoothness of their castings, large and small, was really surprising. When possible, all castings are pickled, both iron and brass, leaving in the former the appearance all are so familiar with in the case of pickled iron castings, but the mixture used for brass work left it with a rich, bright, gold color especially pleasing.

One very commendable feature here noticed, and we are sorry to say a very rare one, is that all sand is ground in a mill, all facing sand used is ground and mixed in a mill while dry and before being dampened, giving it a wonderful degree of consistency, compactness and firmness. All clay for cupola use is put through the same course with the result, we were informed by the foreman, Mr. John Logan, that it was greatly improved and when used to line up cupola it did not readily burn out, the theory advanced being that all lumps, no matter how small were thoroughly pulverized and a degree of closeness and firmness imparted to it that prevented it from cracking and falling off when the cupola was in use.

In the iron foundry some cast iron gears were shown that were simply remarkable for their smoothness and sharp clean cut edges, while in the brass foundry, brass castings for household and decorative purposes exhibited a fineness of detail that we had never seen equalled. A facing containing, we believe, salt and molasses contributes in some cases to this result. In this department we noticed also a small machine used for separating iron particles from brass cuttings coming from the machine shop.

In all we are pleased with the evidence everywhere apparent that with this company *quality* was the main consideration.

## AMONG THE FOUNDRIES.

A foundry at Dundee, N. Y., is for sale.

The Sun foundry plant at Provo, Utah, has been sold to satisfy an attachment of $1,500.

All the pipe foundries of the country are about to effect a consolidation. They explain that they can do it advantageously and not increase the price of pipe by reducing management expenses, saving freights, etc.

By the bursting of a large mold when nearly poured, at the shop of Thomas Marshall, Pittsburgh, March 20th, several men were badly burned, Patrick Moore, fatally, while Joseph Shaffer, Michael Murphy and three others were seriously injured.

Chas. Crompton has commenced the manufacture of manganese bronze at the Star Foundry, Worcester, Mass. He has placed in position a large air furnace for that purpose with a capacity of 6 tons and proposes making a specialty of propeller wheels, etc., having several contracts already on hand.

## THE CHATTANOOGA FOUNDRYMEN'S ASSOCIATION.

THE Chattanooga Foundrymen's Association held its second meeting in the Chamber of Commerce, March 4th.

The constitution and by-laws copied from those of the Philadelphia Foundrymen's Association were read and adopted.

Newell Sanders and M. Llewellyn were each nominated for president, but Mr. Sanders withdrew and Mr. Llewellyn was elected unanimously. The new president was then escorted to the chair and called upon for a speech. He responded in a very happy manner.

Chas. Herron was elected vice-president and Jesse E. Evans secretary and treasurer.

The meetings will be held the first Saturday in each month, and the annual

election of officers the first Saturday in March. The meetings will be in the Chamber of Commerce until permanent quarters can be obtained. The initiation fee is $10; yearly dues, $6. Every foundry in the city is in the association and great interest in its welfare is exhibited by the members. They adjourned to meet Saturday night, March 11th.

At the adjourned meeting every foundry in the city was represented the only business transacted being the appointment of the standing committees, of which the following is a complete list:

On Freights—Hedden, Healy and Farrington.

Prices—Mahoney, Evans and Giles.

Labor—Whiteside, Wagner and Meehan.

Material—Herron, Caldwell and Badwin.

Diversification—Sanders, Walker and Price.

Legislation—Willard, Moffett and Brawner.

Foundry Practice—Isbester, Wheland and Buchanan.

Membership—Wright, Mitchell and Nixon.

The association starts off under the most favorable auspices and THE FOUNDRY extends to it a hearty welcome with the wish that it may be as prosperous as its members could wish.

## NEW FOUNDRY ENTERPRISES.

John Kerr will establish a new foundry at Durham, N. C.

P. & F. Corbin intend building a large new foundry at New Britain, Conn.

Kearney, Neb., is to have a new foundry.

The Gillett-Herzog Co. at Minneapolis, Minn., are about to erect a $25,000 foundry.

A Norfolk, Va., firm intend to establish a foundry opposite Petersburg, Chesterfield County.

The new foundry about to be erected by Messrs. Bayley & Sons at Milwaukee, Wis., will, it is said, be modern in every respect and with the exception of the Allis foundry will be the largest in Milwaukee.

Gus Peck will erect a foundry at La Mars, Ia., immediately.

The St. Clair Foundry Co. is constructing works at West Belleville, Ill.

D. A. McKenzie is about to start a brass foundry in Seattle, Wash.

J. A. Carlisle is about to open a foundry at Newton, Kas.

The Kreber M'f'g. Co. at Marion, O., will build a brick addition to their iron foundry 60x75 feet.

The Deere & Mumes Company are about to enlarge their foundry at Moline, Ill.

Johnson Bros. contemplate the erection of a foundry and machine shop at Washburn, Wis.

Warren Rutherford will start a new foundry and machine shop at Birmingham, Ala.

Wm. Hewelling, a foundryman of Los Angeles, contemplates starting a branch foundry at Phœnix, Arizona.

South Omaha, Neb., is to have good sized iron foundry. Wm. Wearn is the principal mover.

The Excelsior Foundry Co., Eggleston avenue, Cincinnati, recently destroyed by fire, will build on an enlarged scale immediately.

A. G. Morris will erect a large foundry and machine shop on the site of the plant formerly owned by Austin Bros. and Porter at Tyrone, Pa.

The contract for the erection of Loeb foundry at Decatur, Ill., has been let for $15,000, it will be 70x300 ft., and will contain 200 windows.

A. P. Roberts & Co. are adding a foundry to their extensive Pencoyd Iron Works at Bryn, Marion County, Pa. It is 42x80 feet, strongly built for heavy work and having a wing on each side and large crane in center.

The Wallace & Graves foundry at Lafayette, Ind., have purchased the large unused foundry of the Lafayette Car Works at Lafayette, Ind., and will move in immediately. Their present foundry will be used as part of the machine shop. This company seems to be thriving.

Mr. Jordon of Kansas City will remove his foundry to Oklohoma.

The Eagle foundry at, Belleville, Ill., are building an addition to cost $3,500.

The Brown Cotton Gin Co., New London, Conn., will erect an addition to their foundry immediately.

Joseph Bell has bought in the foundry flask, patterns, etc., of the Bell Foundry Company, Wheeling, W. Va., for $1,150.

Robert Poultney is about to engage in the foundry business at Youngstown, O. He has bought the buildings and plant formerly owned by the Youngstown Stove Works.

## THE FIRE FIEND.

R. Gastang's foundry at Alton, Ill., was burned March 20. Loss $5,000.

Fire destroyed the Bass foundry and foundry No. 2 at the Auburn State Prison, N. Y.. March 29th.

The foundry of John Moore Sons & Co. at Raritan, N. J., was burned to the ground March 2d. Loss $3,000.

The machine shop and foundry of Geo. Dalrymple, Fair Haven, Vt., was destroyed by fire March 10. Loss $7,500; insurance $3,500.

The foundry of the Laconia Car Works, Laconia, N. H., was destroyed by fire March 9th. Loss $3,000, covered by insurance.

The foundry of the Kerr-Murray Co. at Fort Wayne, Ind., had a narrow escape from fire March 10. It started by the cupola. Loss $200.

The burning of Lannon's foundry at Pueblo, Colo., March 4th, entailed a loss of $75,000; insurance, $20,000. Eighty men were employed and it will be rebuilt at once.

## CORRECTION.

THE article appearing in the March number of THE FOUNDRY, page 49 and entitled "Pig Iron" was copied from Geo. W. Sisson's most excellent work entitled "The A. B. C. of Iron" and by an oversight of the printer no credit was given.

## THE FOUNDRYMENS' ASSOCIATION

The twenty-third meeting of the Foundrymen's Association was held Wednesday evening, April 5th, at the Manufacturer's Club, Philadelphia.

The report reached us too late for insertion in this number, but will appear next month.

## PERSONAL MENTION.

Jos. A. Burr, President of the Burr & Houston Co., proprietors of the Franklin Iron Foundry, Brooklyn, N. Y., died of pneumonia at his home Wednesday, March 22nd, after three days illness. He was 73 years and nine months old, well known and respected amongst foundrymen in New York and vicinity, having been in the business since 1880, when the Burr & Houston Co. was organized. The business will, no doubt, continue under the same name as Mr. John W. Burr, son of the deceased president, is secretary of the company.

Mr. Richard Brown for many years in charge of the foundry of the Morgan Engineering Company, Alliance, O., has severed his connection with that company and taken charge of the large new foundry plant of the Lake Erie Engineering Company at Buffalo, N. Y. As this is one of the best and most modern foundry equipments in America and intend doing a very heavy class of work, a number of orders for which are now on hand, Mr. Brown is to be congratulated as well as the Lake Erie Engineering Company who have unquestionably secured one of the brightest foundrymen in the country, indeed we question if he has any superior of his own age.

The Berlin Iron Bridge Co. have just completed a power station 38 feet wide by 112 feet long for the Roaring Fork Electric Light & Power Co., at Aspen, Colo.

The Springfield Steel Casting Foundry, at Springfield, Ohio, has just put in a Siemens-Martin open hearth steel plant for the manufacture of all kinds of steel castings. The company also operates an open hearth steel plant.

## A GREAT LABOR SAVER.

HAVING recently visited the Buckeye foundry plant of Aultman, Miller & Co. at Akron, Ohio, we cannot help thinking that some of the impressions there received will be of interest to our readers.

We had already heard of this remarkable foundry, about 100x400 ft. in size; it is well worthy to constitute a part of the great Buckeye Works, which, as everybody knows, is a harvesting machine manufactory of truly gigantic proportions. The foundry building is skirted its entire length by a railroad track, and all the appurtenances for handling, melting and casting iron are of the latest and swiftest design.

The feature of most interest to foundrymen is the Hayes iron carrier. Hon. Lewis Miller who controls the patents on this carrier and who is the general manager of the works has here placed this device in the most perfect working order. The general features of the carrier will have been apprehended by the reader from the cut appearing elsewhere. In the new Buckeye foundry a carrier-track is suspended from the iron truss work which supports the roof. Reaching from end to end of the vast room it constitutes a very striking and interesting spectacle. By it all the floors of the foundry are reached and all the iron is carried. Distance from the cupola causes no objection or loss of time to the molders, because their iron is all carried to them. The latter are not only spared the slavish effort of carrying their iron, but they gain so much time that they can accomplish double the work on the same floor space.

The greatest merit of the whole thing is its simplicity. One cannot help wondering why some such plan has not long since been everywhere adopted. There are no switches, no turn-tables, no hand-carrying, no waste, no slobbering, no danger, nothing to wear out or get out of order. It is certainly the greatest labor saver ever placed in a foundry, and in any foundry of considerable size it cannot fail to pay for itself in a very short time. We noticed particularly the ease with which the work was done. Six men, laborers not molders, were delivering from forty to fifty tons of melted iron to all the floors in the foundry in the three hours or less while the molding was going on, and their task was comparatively easy. The double-handled ladles were filled as fast as they were presented; the single-handled ladles have a hook which is dropped into a staple or hook-eye on the carrier ladle and are thus filled with perfect ease, this process is also shown in the cut.

The Hayes carrier has been used in the old Buckeye foundry for more than seven years, in fact, as we were informed, had it not turned out much more than double the casting, made possible by the carrier, the new shop would have been required years ago. It was born of necessity. It enabled six men to do the work of thirty. Molders with their iron brought to them quadrupled their work.

Having thus briefly outlined the peculiarities of this valuable invention, it only remains to say for the benefit of such of our readers as may be interested that any desired information in regard to shop-rights, cost and terms may be had by addressing Hon. Lewis Miller, Akron, Ohio.

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## GRAND RAPIDS, MICH.

The spring trade has opened up well with every prospect of a very busy busy summer with prices a trifle on the improve.

Work in the jobbing shops is fair.

Litelts & Co., Lowe & Co. and the Michigan Iron Works are doing a fair business.

The Aldine Co. have started their foundry with intentions of putting up a large stock of grates and mantels this season.

The Grand Rapids School Furniture Co. are very slack at present time laying off men and working 5 days a week.

The Sinz Gas Engine Co. are contemplating building a foundry this spring.

The foundry at Jennison has been again under the management of Wm. Andrews, late foreman of the Aldine of this place.

It is reported that the Elliott Button Fastener Co. will erect a foundry at Grand Rapids in the near future.

The Union Foundry Company filed articles of incorporation the first inst. The authorized capital is $5,000, of which $3,000 is paid in. The incorporators are Wm. L. McKay, who holds 250 shares; F. A. Cannon, 25 shares; Chas. W. Cook, 25 shares.

W. S. McCay & Co. are very busy, their increasing orders has necessitated extensive alterations in their foundry and still more are in contemplation. They have orders booked for light castings to carry them well through the summer months.

Most of the foundries were somewhat delayed this spring by the high water. Among them being the Grand Rapids Manufacturing Co.'s shop, Hartman & Son, the Michigan Iron Works, Union Foundry Co., Haney School Seat Co., but are now working full time with good prospects for a busy season.

F. Hartman & Co., founders and machinists are having an increased demand for their standard scales and are very busy in all departments. In the foundry they have work in hand to carry them well into the season. They have secured the work of the Elliott Button Fastener Co., which will require them to run their foundry to the extreme capacity.

## AN EXTINCT AMERICAN IRON INDUSTRY.

THE *Popular Science Monthly* for April, contains an interesting article from the pen of John Gifford concerning the now extinct iron manufacturing industry of New Jersey. In a part of this state but little known or frequented, and known as South Jersey is a peninsula of triangular shape consisting of low or marshy lands whose main product is huckleberries and mosquitoes, but which nearly a hundred years ago was the seat of a great iron industry. As we think it would greatly interest many of our readers as giving a glimpse of early blast furnace life, we reproduce portions of the article.

"The sand of the hills of South Jersey is yellowish in color, because of the iron which it contains. When firmly cemented together by large quantities of iron compounds, a durable ferruginous sandstone or conglomerate is formed, which is the principal building stone of the region. In contact with decomposing organic materials, ferric oxide, the insoluble reddish coloring matter in the hills, is reduced to ferrous oxide, which combines with carbonic acid to form a carbonate of iron, which is soluble in water containing an excess of carbonic acid. Thus it is carried by the water to the bogs, where the carbonic-acid gas is exchanged for oxygen and the iron is precipitated in the form of ferric oxide; but, if there is a large quantity of decomposing peat present, it is deposited in the form of ferrous carbonate. Thus the so-called "bog iron ore" is formed.

The "raising" of this ore and the manufacture of iron therefrom was the leading industry of South Jersey during the early part of this century. Charcoal was the fuel used and coalings were common throughout the "Pines." An active coaling is now seldom seen. Shells were hauled by wagon or rowed and poled by scow from the seashore for a flux, the oyster then being of more value for that purpose than for food. Better oysters could be picked from those shell heaps than can be bought at the stands to-day. In a memorandum kept by the "master ore-raiser" for one of the largest furnaces there are many interesting notices of large quantities of clams and rum bought and sold, but the oyster is never mentioned. These account-books were decorated with the pictures of soldiers and warships, showing well the prevailing thought of those days.

Scattered here and there along these streams are the remains of what were once centers of a flourishing industry. In some places the furnaces and forges have been completely obliterated and forgotten; in others only bits of black slag remain; while in others the ruins are still standing. At the head of the Tuckahoe River there is a crumbling stack, at Allaire there are ruins, and at Weymouth the course of a canal may be

traced by which the ore was brought to the furnace from the bog.

The places were connected by stage routes, along which at regular intervals were the famous "jug taverns" of old, the ruins of which in many localities may still be seen. They are now in the midst of the forest, and, like the remains of the forges and furnaces, are sad reminders of more prosperous days. To-day one may wander for miles along these old overgrown roads without seeing a single human habitation.

In 1766 a furnace was built at Batsto, one of the first and at one time the largest in this country. Batsto is in the heart of the "Pines," at the head of Mullica River. Battles were fought at Chestnut Neck near the mouth of this river, at one time a large and prominent settlement, and cannon balls, old pennies, and pebbles oddly decorated on one side have been found on the beach. Skeletons of men have been bared by the winds, which some think are those of soldiers and others of Indians, since it was once an Indian village, as is indicated by potsherds, broken shells, flints, and other signs scattered all over the surface of the ground. Munitions of war were cast there for the Revolution. General Greene himself owned a twelfth interest in the Batsto furnace, but sold out his share when he entered the army.

Extending northward from the Mullica River are the "Plains," a desolate region inhabited at one time, they say, by wild hogs, pine robbers, and pirates.

Weymouth was another important place. Materials were forged there for the war of 1812, and street lamps standing to-day in Philadelphia and waterways in Mobile were molded there.

Scattered here and there throughout the "Pines" were active, thriving "bloomeries." Now all is silence, save for the noises of the woods. Instead of the buzz of the mill and the commotion of men at work, there can now be heard only the chirping of insects and the song of the cheewink by day and the croaking of toads and frogs at night. The ruins of forges and furnaces, the large, dilapidated houses, the overgrown roads, the wharves, the sluices, the piers, the old fences, and the masses of black coal-dirt on the landings where vessels once came for wood and charcoal, are all evidences of what the country was when iron was made from "bog ore." In the houses and ample barns even of more recent date the spiders have woven their webs, the wasps have mudded the walls, and the rats scamper at home through the deserted rooms. Many orchards are untrimmed and sterile, many meadows flooded, and many fields overgrown with briers and Indian grass.

After the death of the iron manufacture South Jersey passed into another industrial stage—the making of glass. The glory of this industry is also passing, and ruins of old factories are not uncommon.

Those furnaces and forges mark the infancy of the iron industry in America—an industry which has made this century "the age of iron." Its local decline was natural and unavoidable—due to an inadequate supply of ore, a crude manner of manufacture, and difficult means of transportation."

## NOTICE.

All advertisements under this head given two insertions free of charge when placed therein by subscribers. All others will be charged 2 cents per word for each insertion.

WANTED HELP—Wanted by the Hastings Iron Works, Hastings, Neb., a competent molder for general work, also a good pattern-maker. *

A PRACTICAL FOUNDRY FOREMAN of long experience in its different branches, having eighteen years experience in the manufacture of car wheels, desires a position. Address this office. *

FOUNDRY FOREMAN—A man with 15 years experience as such, desires to make a change; can furnish A 1 references as to ability and reliability. Distance no object. Address. Change, care this office. *

FOUNDRY FOREMAN—Should you desire to make a change in your foundry management and secure a capable man with the best of references, address W. P. B., care of The Foundry, *

WANTED—A position as foreman in a foundry by a molder who has had fourteen years experience in the north of England as a locomotive and marine molder, also four years at government work at Armstrong's, with ten years as a machinery molder in the United States. Address, John Faleers, 530 Chase avenue, Joliet, Ill. *

WANTED—Superintendent for large iron manufacturing plant, one that understands all branches of iron foundry and pipe work. Young man preferred. Post office box 437, Montreal, Canada. *

WANTED—A first-class stove-pattern filer and fitter, one who has had some experience on radiators preferred. Address, H. Belfield & Co., Norristown, Pa. *

SITUATION WANTED—An experienced and energetic iron molder, fully capable of taking charge of a foundry, would like a position of that kind. Good references. Address, Experience, this office.

**Advertisements inserted under this head for 25 cents a line each insertion.**

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country and a small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

FOR SALE CHEAP—In Paw Paw, Mich., on Toledo & South Haven R.R., a small Foundry and Machine Shop the latter doing good business and the foundry only needs a good man to work up a steady trade; everything complete; good chance to right man. Address, A. J. Sabin, Paw Paw, Mich.

FOR SALE AT A BARGAIN—One No. 3 Root blower, second-hand, in good condition. Apply to Foundry Department, Hopedale Machine Co., Hopedale, Mass.

WANTED—A foundry at Bevier, Mo. Bevier is situated in the center of a great coal field on the C. B. & Q. R. R., and invites your attention. To the right party we believe a splendid opening exists. Address, Bevier Board of Trade, Bevier, Mo.

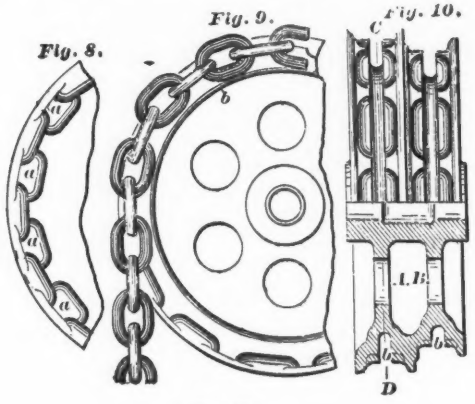
## DIFFERENTIAL CHAIN PULLEYS.

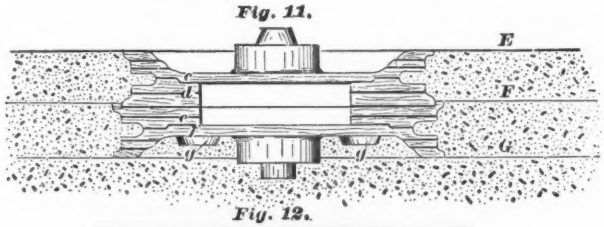
WHEN the groove in a chain wheel or pulley is made to fit the links of a chain it is sure to be an expensive pattern, especially when made double, like those used in Weston's Differential Pulley Blocks.

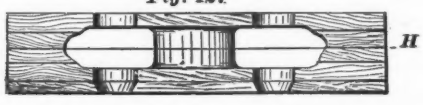
Figs. 9 and 10 are two views of one of this kind of pulley. Fig. 10 shows a half section and the pockets for the chain. Fig. 9 is a section through the groove *C, D,* of the large pulley, which has one more pocket than the smaller one. This view also shows how the chain fits into the pockets.

It may not be out of place here to make a few remarks about this celebrated Differential Pulley Block that has so revolutionized the lifting of heavy weights, and for which this kind of pulley was used, in fact, this pulley was the main feature of the patent. T. A. Weston was in this country when he conceived the idea that led up to the Differential Pulley Block.

While Mr. Weston was at Buffalo, witnessing attempts to raise a vessel that had gone down off that city, the thought occurred to him that necessary power could be obtained from the Chinese windlass, the rope of which winds on two unequal diameters, that is, one-half the length of the barrel is larger in diameter than the other. This is practically what this pulley block is developed from.




After much scheming, Weston re-

turned to England and called on numerous engineering establishments, submitting his drawings, but he could find none that would take hold and experiment on his block. Finally he called into a small job shop where the proprietors themselves were working men, paying the extravagant rent of ten shillings a week, and employing six men. That firm has grown since then and employs as many thousands now. I refer to Tangye Bros., Birmingham.

These brothers labored hard to make the block work, and experienced many unexpected difficulties, and when they had perfected it and made it a commercial success, a new difficulty presented itself in the shape of a law-suit in which the Tangyes won. It is pretty hard to conceive of any taller swearing than was practiced by the would-be infringers in this case, but I will return to the pattern of the pulley.

They are sometimes made so that all the links of the chain fit into the pockets, but this is an unnecessary expense. The links of the chain that set edgewise in the pulley do not need to fit into pockets like those shown at *a*, in Fig. 8. If the grooves *b b*, in Fig. 10, be turned deep enough to clear these links and pockets made for the other links to set in, it will be sufficient to catch the chain, and will work better than otherwise.

The groove is sometimes formed in a core-box, and a print put on the periphery of the pattern, thus making fewer partings in the patterns as well as the mold; but a much cleaner and better casting can be obtained from a pattern with the groove for the chain cut in it.

Fig. 11 is the section of the pattern and shows how it is made. The mold is also represented with the cope lifted off, the partings being at *E, F, G.* The pattern is built up with segments and made in four parts, *c, d, e, f.* As will be seen, the casting is cored out at *A, B,* in Fig. 10.

Fig. 12 is a section of the core-box for this core, and is parted at *H.* The core sets into the round prints *g. g.*; but there are no cope prints, for the reason that it is not easy to close the cope over the six round projecting cores. In the absence of these cope prints the molder will need to take care that the cope bears on the top of these projecting cores enough to prevent the iron from running in the vent holes of the core, when pouring.

This lightening core can be made in halves or whole, just as the core-maker chooses.—*Machinery Pattern Maker.*

EVERY EYE ON GODEY'S

is completely taken with it.

Some were captured by complete and handsomely illustrated **NOVEL,** but it was those

**Colored Portraits**

of Society Ladies, in the fashion department, that "finished the business." Every eye will welcome our

**CLUBBING ANNOUNCEMENT**

(Thatsounds queer doesn't it?)

A year's subscription to both

GODEY'S
21 PARK ROW,
N. Y. CITY,
and

## MARKET REVIEW.

REPORTED EXPRESSLY FOR "THE FOUNDRY."

Some years ago when a record of 2.40 was attained by the fast horses of those days, the horse men shook their heads and said it would never be beaten, but

gradually it has been whittled down until in our day and generation we find it getting very close to 2.04. During all these years of gradual increase in speed and decline in time made the same cry, has been heard and is heard yet, viz: that further change impossible.

'Tis thus also with the pig-iron dealer but while he has been declaring that reductions in price were out of the question he must be credited with having honestly believed what he said, for to him further decline seemed impossible, and it is just possible that he may be found to be right, for there is a limit to all things and one is certain that whittling in prices has not been indulged in to any extent for the last sixty days and buyers are the ones to make the concessions. Prices are firmer and there is no doubt about it, and buyers need not look for anything lower for some time to come and if they get it they will not get much.

Our correspondents quote as follows:

## CINCINNATI.

April 1, 1893.

We quote for cash f. o. b. cars Cincinnati :

| | |
|---|---|
| Southern Coke, No. 1, F'dry | $13 25 to $13 50 |
| " " No. 2, " and No. 1 Soft, | 12 00 to 12 25 |
| Hanging Rock Coke, No. 1 | 15 50 to 16 00 |
| " " Charcoal, No. 1 | 18 50 to 19 50 |
| Tennessee Charcoal, No. 1 | 16 00 to 16 50 |
| Jackson Co. Stone Coal, No. 1 | 16 00 to 16 50 |
| Southern Coke, Gray Forge | 11 00 to 11 25 |
| " " Mottled | 10 75 to 11 00 |
| Standard Alabama Car Wheel | 18 00 to 19 00 |
| Tennessee " " | 17 00 to 17 50 |
| Lake Superior " " | 17 50 to 18 00 |

Rogers, Brown & Co.

## CHICAGO.

April 1, 1893.

We quote for cash f. o. b. Chicago:

| | |
|---|---|
| Southern Coke No. 1 Soft | $13 35 to $13 60 |
| Southern Coke No. 2 Soft | 12 85 to 13 00 |

Rogers, Brown & Merwin.

## BOSTON.

April 1, 1893.

We quote for cash delivered Boston :

| | |
|---|---|
| Alabama No. 1 Foundry | $15 50 to $16 00 |
| " " 2 " and No. 1 Soft | 14 50 to 15 00 |
| " " 3 " " 2 " | 14 00 to 14 50 |
| " " C. C. Car Wheel | 20 00 to 20 50 |
| Strong L. S. Coke Iron No. 1 Foundry | 17 25 to 17 70 |
| Lake Superior Charcoal Car Wheel | 19 50 to 20 00 |
| American Scotch (Northern) No. 1 | 17 00 to 17 50 |

Rogers, Brown & Co.
F. G. Gibbs, Resident Agent.

## ST. LOUIS.

April 1, 1893.

*We quote for cash f. o. b St. Louis :*

| | |
|---|---|
| Southern Coke, No. 1 | $13 75 to $14 00 |
| " " No. 2 | 12 50 to 12 75 |
| " " *No. 3* | *12 25 to 12 50* |
| " Gray Forge | 11 50 to 11 75 |
| " Charcoal No. 1 | 15 50 to 16 00 |
| *Missouri* " *No. 1* | *14 00 to 14 50* |
| Ohio Softeners | 16 50 to 17 00 |
| Lake Superior Car Wheel | 17 50 to 18 00 |
| Southern " " | *18 25 to 18 50* |
| Frick's Connellsville Foundry Coke | 5 65 |

Rogers, Brown & Meacham.
J. K. Pollock, Manager.

## BUFFALO.

April 1, 1893.

We quote for cash f. o. b. Buffalo.

| | |
|---|---|
| No. 1 X Foundry, Strong, Coke Iron, Lake Superior ore | $14 50 |
| No. 2 X Foundry, Strong, Coke Iron, Lake Superior ore | 13 75 |
| Ohio Strong Softener No. 1 | 14 50 |
| Jackson County Silvery No. 1 | $17 00 to 17 30 |
| Lake Superior Charcoal | 17 25 |
| Tennessee Charcoal | 18 00 |
| Southern Soft No. 1 | 14 00 |
| Alabama Car Wheel | 19 00 |
| Hanging Rock Charcoal | 20 50 |

Rogers, Brown & Co.
W. T. Shepard, Mgr.

## PHILADELPHIA.

March 4, 1893.

We quote for cash f. o. b. cars Philadelphia.

| | |
|---|---|
| Standard Ala. No. 1 X | $15 00 to $15 25 |
| " " No. 2 X | 14 00 to 14 25 |
| Embree or Equivalent, No. 1, X | 15 25 to 15 50 |
| " " No. 2, X | 14 25 to 14 50 |
| Strong Lake Ore Coke Iron, No. 1 X | 16 00 to 16 50 |
| " " " " " No. 2 X | 15 00 to 15 50 |
| Lake Superior Charcoal | 18 50 to 19 00 |
| Standard Alabama C. C. C W | 20 00 to 20 50 |

Rogers, Brown & Warner.

## NEW YORK.

March 4, 1893.

We quote for cash f. o. b. New York.

| | |
|---|---|
| No. 1 Foundry, Lake Ore, Coke Iron | $16 00 to $16 50 |
| No. 2 " " " " | 15 00 to 15 50 |
| No. 1 American-Scotch | 16 00 to 16 50 |
| No. 2 " " | 15 00 to 15 25 |
| No 1 Standard Southern | 15 00 to 15 25 |
| No. 2 " " and No. 1 Soft | 14 00 to 14 50 |
| Standard Southern Car Wheel | 20 00 to 21 00 |

Rogers, Brown and Warner.

## PITTSBURGH.

April 1, 1893.

Quotations are as follows:

| | |
|---|---|
| No. 1 Foundry | $14 25 to $14 50 cash. |
| No. 2 Foundry | 13 25 to 13 50 " |
| Gray Forge | 12 25 to 12 50 " |
| Warm Blast Charcoal | 18 00 to 22 00 " |
| Cold Blast Charcoal | 22 00 to 27 00 " |
| Bessemer | 14 25 " |

A. H. Childs.

## LOUISVILLE.

April 1, 1893.

We quote for cash cars Louisville:

| | |
|---|---|
| Southern Coke, No. 1 foundry | $13 00 to $13 25 |
| " " " 2 " | 12 00 to 12 25 |
| " " " 3 " | 11 00 to 11 25 |
| " " Grey Forge | 10 75 to 11 00 |
| " Charcoal, No. 1 foundry | 15 00 to 16 00 |
| " Car Wheel | 17 50 to 17 75 |
| Spahite | 13 25 |

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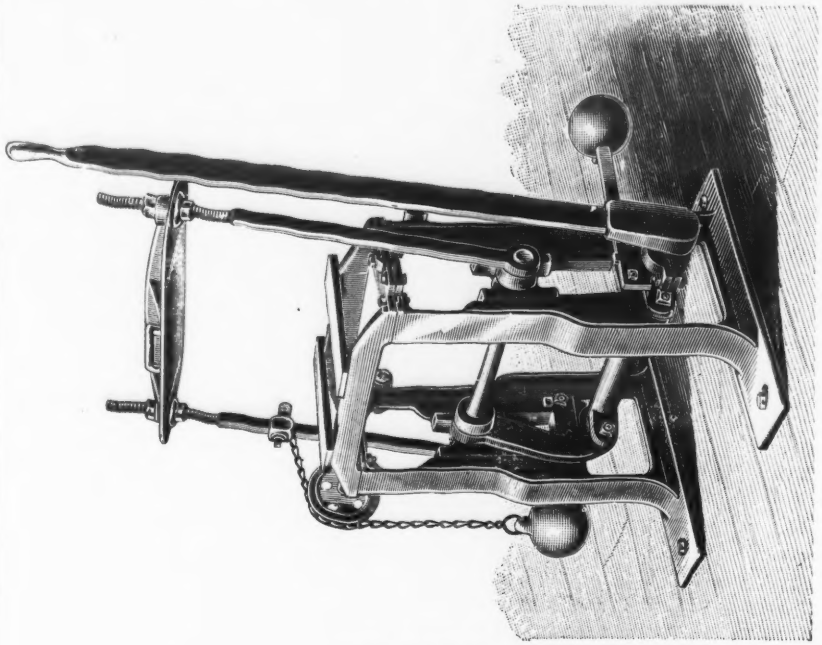

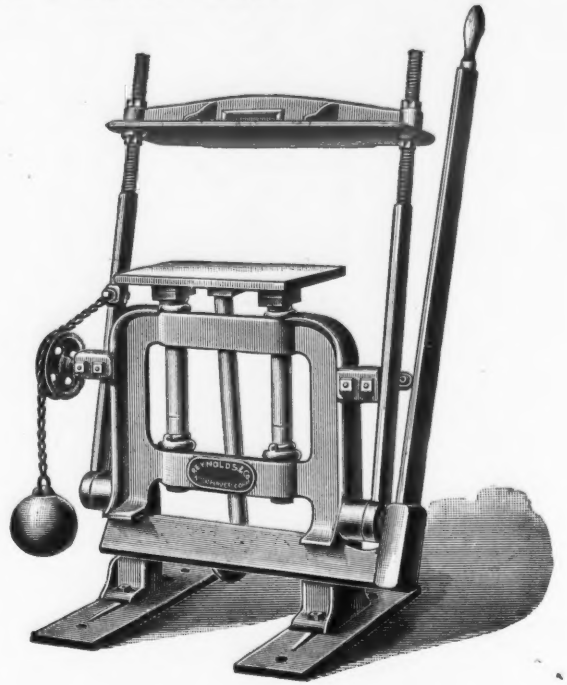

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| Dusting Brushes, | Swabs. | | |

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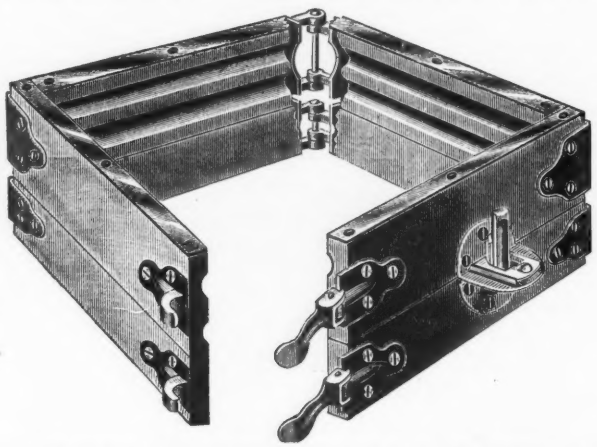

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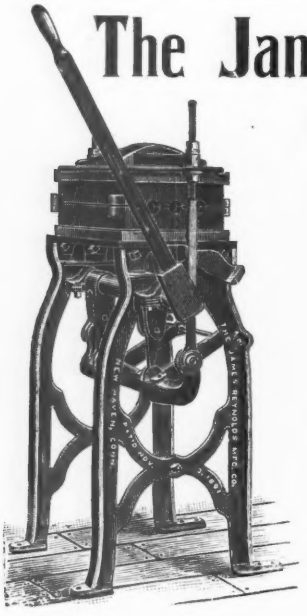

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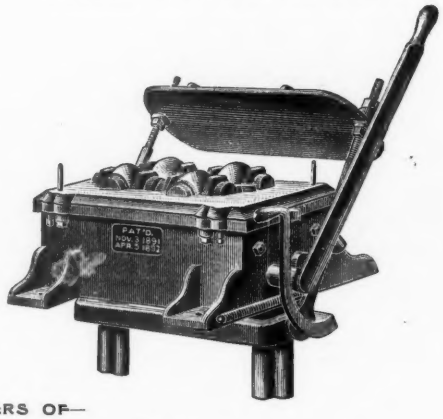

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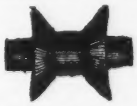

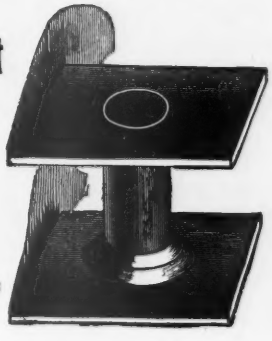

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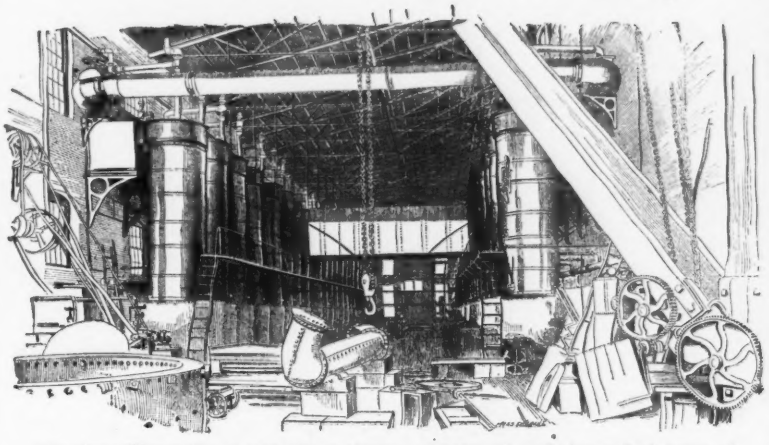

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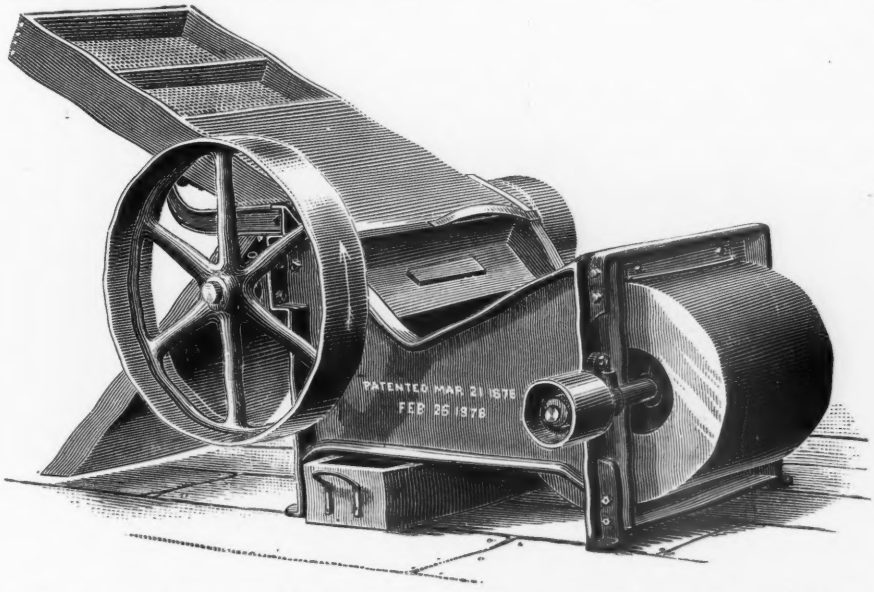


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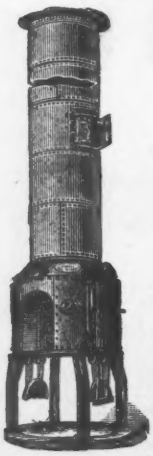

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